SOUTH CENTRAL REGION MULTI-JURISDICTION HAZARD MITIGATION PLAN UPDATE

May 14, 2018

Prepared by:
South Central Regional Council of Governments
127 Washington Avenue, 4th Floor West
North Haven, Connecticut 06473

SCRCOG SOUTH CENTRAL REGIONAL COUNCIL OF GOVERNMENTS
Planning for Our Region's Future

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South Central Regional Council of Governments
127 Washington Avenue
4th Floor West
North Haven, CT 06473
(203) 234-7555

Prepared by:

Jamie Caplan Consulting LLC
351 Pleasant Street, Suite B #208
Northampton, MA 01060
413-586-0867

JAMIE CAPLAN CONSULTING LLC
Emergency Management Services

With assistance from:

Milone and MacBroom, LLC

and

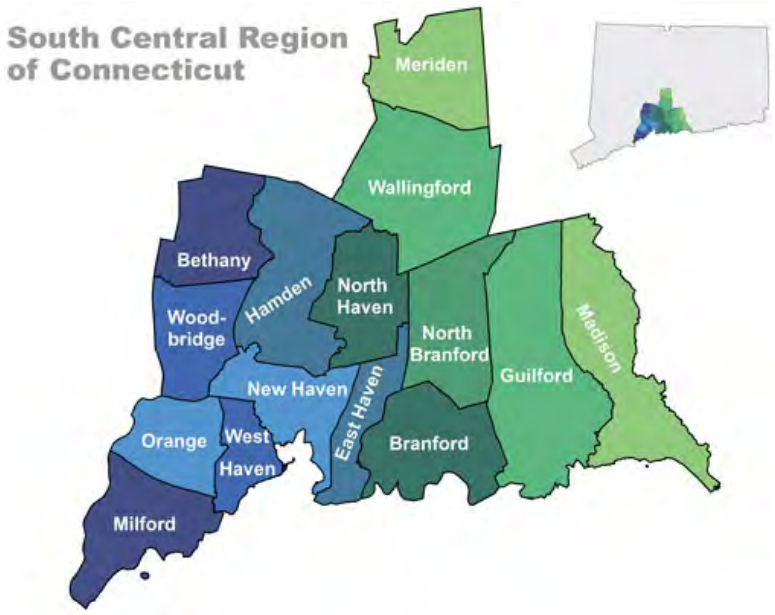
Punchard Consulting, LLC

MILONE & MACBROOM

PUNCHARD CONSULTING

PARTICIPATING JURISDICTIONS

Town of Bethany
Town of Branford
Town of East Haven
Town of Guilford
Town of Hamden
Town of Madison
City of Milford
City of New Haven
Town of North Branford
Town of North Haven
Town of Orange
Town of Wallingford
City of West Haven
Town of Woodbridge



ACKNOWLEDGEMENTS

South Central Regional Council of Governments

- Carl Amento, Executive Director
- Eugene Livshits, Senior Regional Planner
- Rebecca Andreucci, Regional Planner

Town of Bethany

- Clark Hurlbert, Second Selectman/Deputy Emergency Management Director

Town of Branford

- Janice Plaziak, Town Engineer

Town of East Haven

- Joseph Maturo, Jr., Mayor
- Matthew, Marcarelli, Fire Chief, Director of Emergency Management
- Jerry Tramontano, Engineering
- Kevin White, Engineering

Town of Guilford

- Kevin Magee, Environmental Planner

Town of Hamden

- David Berardesca, Fire Chief, Director of Emergency Management
- Mark Austin, Town Engineer
- Matt Davis, Assistant Town Planner
- Andrew Kimlock, GIS Coordinator
- Dan Kops, Town Planner

Town of Madison

- David Anderson, Director of Planning & Economic Development
- Sam DeBurra, Director of Emergency Management
- John Iennaco, Director of Public Works/Town Engineer

City of Milford

- Benjamin Blake, Mayor

City of New Haven

- Giovanni Zinn, City Engineer
- Stacey Davis, City Planner I
- Rick Fontana, Deputy Director of Emergency Management/Operations
- Michael Piscitelli, Deputy Economic Development Administrator

Town of North Branford

- Kurt Weiss, P.E., Town Engineer

Town of North Haven

- Jonathan Bodwell, P.E., Town Engineer

Town of Orange

- Fred Palmer, Director of Emergency Management
- Tino Russo, Deputy Director, Emergency Management

Town of Wallingford

- Richard Heidgerd, Fire Chief - Emergency Management Director

City of West Haven

- Abdul Quadir, City Engineer
- David Killeen, Assistant City Planner
- Mark Paine, Assistant to Public Works Commissioner

Town of Woodbridge

- Warren Connors, Public Works Director

Greater New Haven Water Pollution Control Authority

- Tom Srgroi, Director of Engineering
- Isabella Schroeder, Senior Engineer

ADOPTION RESOLUTIONS

CERTIFICATE OF RESOLUTION

TOWN OF XX, CONNECTICUT

A RESOLUTION ADOPTING THE

2018 SOUTH CENTRAL REGION MULTI-JURISDICTION HAZARD MITIGATION PLAN UPDATE

WHEREAS, the Town of XX has historically experienced damage from natural hazards and it continues to be vulnerable to the effects of those hazards profiled in the plan (i.e. flooding, drought, ice jams, hurricanes, severe winter storms, thunderstorms, tornadoes, and wildfires) resulting in loss of property and life and threats to public health and safety; and

WHEREAS, the Town of XX has developed and received conditional approval from the Federal Emergency Management Agency (FEMA) for its hazard mitigation plan update entitled **SOUTH CENTRAL REGION MULTI-JURISDICTION HAZARD MITIGATION PLAN UPDATE**, 2018 under the requirements of 44 CFR 201.6; and

WHEREAS, public and committee meetings were held throughout the planning process regarding the development and review of the Plan; and

WHEREAS, the Plan specifically addresses hazard mitigation strategies and Plan maintenance procedures for the Town of XX; and

WHEREAS, the Plan recommends several hazard mitigation actions/projects that will provide mitigation for specific natural hazards that impact the Town of XX, with the effect of reducing vulnerabilities and protecting people and property from loss associated with those hazards; and

WHEREAS, adoption of this Plan will make the Town of XX eligible for funding to reduce long term risks of future hazards; now therefore be it

RESOLVED by the Town of XX Select Board:

1. The Plan is hereby adopted as an official Plan of the Town of XX;
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 are required by 44CFR 201.6 and FEMA are hereby adopted as part of the resolution for a period of five (5) years from the date of this resolution; and
4. An annual report on the progress of the implementation elements of the Plan shall be presented to the Select Board by the Public Works Director.

In accordance with the authority vested in the Town of XX Select Board, they thereby adopt the **SOUTH CENTRAL REGION MULTI-JURISDICTION HAZARD MITIGATION PLAN UPDATE**, 2018.

Adopted by a vote of ___ in favor, ___ against, and ___ abstaining this ___ day of XX, 2018.

Signature(s) of First Selectperson or entire Board

IN WITNESS THEREOF, the undersigned has affixed her/his signature and the corporate seal of the Town of XX.

Signature and seal of certifying witness.

RECORD OF CHANGES

This Multi-Jurisdiction Hazard Mitigation Plan Update, including Appendices, will be reviewed and approved on an annual basis by the Advisory Committee and following any major disasters. All updates and revisions to the plan will be tracked and recorded in the following table. This process will ensure the most recent version of the plan is disseminated and implemented by the SCRCOG and the participating jurisdictions.

Date of Change	Entered By	Summary of Changes

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LIST OF ACRONYMS

ALE	Annualized Loss Estimate
ASDSO	Association of State Dam Safety Officials
BFE	Base Flood Elevation
CDBG-DR	Community Development Block Grant Disaster Recovery
CERT	Community Emergency Response Team
CIRCA	Connecticut Institute for Resilience and Climate Adaption
CRS	Community Rating System
CT ECO	Connecticut Environmental Conditions Online
DEEP	Connecticut Department of Energy Environmental Protection
DFIRM	Digital Flood Insurance Rate Map
EAB	Emerald Ash Borer
EF Scale	Enhanced Fujita Scale
EMAC	Emergency Management Assistance Compact
EPA	Environmental Protection Agency
EPR	End Point Rate
EWP	Emergency Watershed Protection
F Scale	Fujita Scale
FEMA	Federal Emergency Management Agency
FIRM	Flood Insurance Rate Map
FIT	Flood Information Toolkit
FMA	Flood Mitigation Assistance
FWS	Fish and Wildlife Service
GIS	Geographic Information System
GNHWPCA	Greater New Haven Water Pollution Control Authority
HMGP	Hazard Mitigation Grant Program
HMP	Hazard Mitigation Plan
HUD	Department of Housing and Urban Development
IPCC	Intergovernmental Panel on Climate Change
LRR	Linear Regression Rate
LRTP	Long Range Transportation Plan
MetroCOG	Metropolitan Council of Governments
MHHW	Mean Higher High Water
MMI	Modified Mercalli Intensity
NCDC	National Climatic Data Center
NCEI	National Centers for Environmental Information
NESIS	Northeast Snowfall Impact Scale
NFIP	National Flood Insurance Program
NGDC	National Geophysical Data Center
NOAA	National Oceanic and Atmospheric Administration
NPDP	National Performance of Dams Program
NRCS	Natural Resources Conservation Service
NROC	Northeast Regional Ocean Council
NSSL	National Severe Storms Laboratory
PA	Public Assistance
PDM	Pre-Disaster Mitigation

PDSI	Palmer Drought Severity Index
POCD	Plan of Conservation and Development
REPT	Regional Emergency Planning Team
RESP	Regional Emergency Support Plan
RLP	Repetitive Loss Property
RSI	Regional Snowfall Index
RWA	Regional Water Authority
SCCRWA	South Central Connecticut Regional Water Authority
SCRCOG	South Central Regional Council of Governments
SFHA	Special Flood Hazard Area
SHPO	State Historic Preservation Office
SRLP	Severe Repetitive Loss Property
SSG	Southern Connecticut Gas
TNC	The Nature Conservancy
TOD	Transit Oriented Development
UCONN-CLEAR	University of Connecticut Center for Land Use Education and Research
USGS	United States Geological Survey
WDS	World Data Service

CHAPTER 1. INTRODUCTION

The Federal Emergency Management Agency (FEMA) defines mitigation as "the effort to reduce loss of life and property by lessening the impact of disasters. Mitigation is taking actions now – before the next disaster – to reduce human and financial consequences later (analyzing risk, reducing risk, insuring against risk.)"[1]

"The purpose of mitigation planning is to identify policies and actions that can be implemented over the long term to reduce risk and future losses. Mitigation plans form the foundation for a community's long-term strategy to reduce disaster losses and break the cycle of disaster damage, reconstruction, and repeated damage. The planning process is as important as the plan itself. It creates a framework for risk-based decision making to reduce damages to lives, property, and the economy from future disasters."[2]

"DMA 2000 (Public Law 106-390)[3] provides the legal basis for FEMA mitigation planning requirements for State, local and Indian Tribal governments as a condition of mitigation grant assistance. DMA 2000 amended the Robert T. Stafford Disaster Relief and Emergency Assistance Act by repealing the previous mitigation planning provisions and replacing them with a new set of requirements that emphasize the need for State, local, and Indian Tribal entities to closely coordinate mitigation planning and implementation efforts."[4]

The South Central Regional Council of Governments (SCRCOG) was awarded a FEMA Hazard Mitigation Planning grant administered by the Connecticut Department of Emergency Services and Public Protection) to develop a Multi-Jurisdiction Hazard Mitigation Plan Update for fourteen jurisdictions. The original hazard mitigation plan included ten jurisdictions, four were added to this update. SCRCOG hired a consulting team led by Jamie Caplan Consulting, LLC (JCC) with support from Milone and MacBroom and Punchard Consulting to develop the Plan.

The significance of the South Central Region Multi-Jurisdiction Hazard Mitigation Plan Update is that it provides the Region with a comprehensive mitigation strategy for prioritizing projects, programs and activities that will save lives and reduce losses from impacts of natural disasters. Participating in a multi-jurisdiction plan was a way for the fourteen jurisdictions to achieve economies of scale. This Plan defines responsibilities and analyzes local capacities and capabilities to manage mitigation projects. It also fulfills FEMA's requirement for a mitigation planning process that first, ensures federal assistance to these fourteen South Central Connecticut jurisdictions and second, allows the local governments to compete for millions of dollars of mitigation project assistance annually. This Multi-Jurisdiction Hazard Mitigation Plan Update defines risk and vulnerability in a systematic manner, and analyzes the vulnerability of critical structures with respect to mapped known natural hazard areas. It also provides a framework for informed decision-making regarding prioritization of mitigation projects that will ensure both the protection of life and property and cost-effective use of taxpayer's funds.

SCRCOG staff took the leadership with the planning process, which eased the burden of a single jurisdiction having to assume all of the planning work. They will assume this leadership role for future updates of the South Central

[1] Federal Emergency Management Agency (FEMA). *What is Mitigation?* Accessed January 2014 http://www.fema.gov/what-mitigation
[2] FEMA. *Multi-Hazard Mitigation Planning.* Accessed January 2014 http://www.fema.gov/multi-hazard-mitigation-planning
[3] Disaster Mitigation Act of 2000, Pub. L. 106-390, as amended
[4] FEMA. *Disaster Mitigation Act of 2000.* Accessed January 2014 http://www.fema.gov/media-library/assets/documents/4596?id=1935

Region Multi-Jurisdiction Hazard Mitigation Plan Update. FEMA requires that the jurisdictions update this Plan every five years to remain eligible for non-emergency public assistance from FEMA in the form of grants.

PURPOSE

The significance of the South Central Region Multi-Jurisdiction Hazard Mitigation Plan Update is that it provides the Region with a comprehensive mitigation strategy for prioritizing projects, programs and activities that will save lives and reduce losses from impacts of natural disasters. Participating in a multi-jurisdiction plan was a way for the fourteen jurisdictions to achieve economies of scale. This Plan defines responsibilities and analyzes local capacities and capabilities to manage mitigation projects. It also fulfills FEMA's requirement for a mitigation planning process that first, ensures federal assistance to these ten South Central Connecticut jurisdictions and second, allows the local governments to compete for millions of dollars of mitigation project assistance annually.

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AUTHORITY

The SCRCOG Board and each of the fourteen jurisdictions participating in this Hazard Mitigation Plan have adopted the South Central Region Multi-Jurisdiction Hazard Mitigation Plan Update. The adoption notices are included prior to this introduction. The Plan was developed in accordance with current state and federal regulations governing hazard mitigation plans. The contractors, SCRCOG staff and the Advisory Committee used FEMA's Local Mitigation Planning Handbook, March 2013, and the Local Mitigation Plan Review Guide, October 2011, and Demonstrating Good Practices Within Local Hazard Mitigation, Region 1, Boston, MA April 2017 as references for this plan.

SCRCOG

The South Central Regional Council of Governments (SCRCOG) provides a platform for inter-municipal coordination, cooperation and decision-making. SCRCOG is made up of fifteen jurisdictions: Bethany, Branford, East Haven, Guilford, Hamden, Madison, Meriden, Milford, New Haven, North Branford, North Haven, Orange, Wallingford, West Haven, and Woodbridge. Over the years, SCRCOG has primarily addressed issues of transportation and land use planning. However, in recent years, the SCRCOG has taken on such additional issues as foreclosure prevention and pre-disaster natural hazard mitigation planning.

The SCRCOG region covers approximately 570,000 people, or 1/6th of the state's population. SCRCOG has a staff of six employed in its offices in North Haven.

In 1948, a few jurisdictions in the SCRCOG region were the first to take advantage of the opportunity afforded by recently enacted legislation to voluntarily form the Regional Planning Authority of the South Central Region. By 1960, the authority was serving all fifteen towns in the Region. In 1985, the South Central Regional Council of Governments was established with the approval of each legislative body from the fifteen jurisdictions. Today, the fifteen mayors and first selectmen of the SCRCOG member cities and towns meet monthly to promote regional collaboration and to address issues of regional importance.

MITIGATION PLAN GOALS

The purpose of the South Central Region Multi-Jurisdiction Hazard Mitigation Plan is to provide the region with a comprehensive examination of all natural hazards affecting the region and to provide a framework for informed decision-making regarding the selection of cost-effective mitigation actions. These mitigation actions, when implemented, will reduce the region's risk and vulnerability from natural hazards. The Plan also documents the mitigation planning process that is required by the DMA 2000.

This Plan is the result of a collaborative effort between many stakeholders representing the region, including SCRCOG staff, the governments of the ten participating jurisdictions and The Nature Conservancy. Throughout the development of the Plan, the Advisory Committee, a formal committee with at least one representative from each of the participating jurisdictions, provided leadership. The Advisory Committee reviewed mitigation goals, reviewed research regarding natural hazard risk and vulnerability assessments and identified and prioritized mitigation actions. They also prepared a mitigation implementation strategy with recommendations designed to save lives and reduce losses from future disasters caused by natural hazards.

The mission of the South Central Region Multi-Jurisdiction Hazard Mitigation Plan is to: reduce or eliminate risk to people and property from natural hazards.

2014 Multi-Jurisdiction Hazard Mitigation Plan Mission

Reduce or eliminate risk to people and property from natural hazards.

The Jamie Caplan Consulting team, SCRCOG staff and the Advisory Committee adhered to the following guiding principles in the plan's development.

GUIDING PRINCIPLES FOR PLAN DEVELOPMENT[5]

- Focus on the mitigation strategy. The mitigation strategy is the plan's primary purpose. All other sections contribute to and inform the mitigation strategy and specific hazard mitigation actions.
- Process is as important as the plan itself. In mitigation planning, as with most other planning efforts, the plan is only as good as the process and people involved in its development. The plan should also serve as the written record, or documentation, of the planning process.
- This is your community's plan. To have value, the plan must represent the current needs and values of the community and be useful for local officials and stakeholders. Develop the mitigation plan in a way that best serves your community's purpose and people.

[5] Local Mitigation Planning Handbook, FEMA March 2013, p.I-2.

The theme throughout the planning process was:

Jurisdictions are individual entities with specific characteristics/risks that need to be addressed.

With this theme in mind, the planning process included the development of a Public Outreach Strategy, four Advisory Committee meetings, fourteen Jurisdiction meetings and fourteen Public Workshops. Significant effort was made throughout the planning process to capture the specific risks and mitigation actions for each jurisdiction as well as to examine the region as a whole.

The Advisory Committee identified the following twelve hazards to profile:

1. Coastal Erosion
2. Dam Failure
3. Drought
4. Earthquake
5. Extreme Temperatures
6. Flood
7. Hurricane/Tropical Storm
8. Sea Level Rise
9. Severe Thunderstorm
10. Severe Winter Storm/Nor'easter
11. Tornado
12. Wildfire

Following the hazard identification, a risk analysis was conducted to determine vulnerability for each participating jurisdiction. Included in the risk analysis were community assets, vulnerable assets, potential impacts, loss estimates and problem statements. This approach enabled the theme of "jurisdictions are individual entities with specific risks" to be examined. The problem statements at the end of each jurisdiction's risk analysis bridged the gap to capabilities and mitigation actions by identifying hazards and geographic areas of concern as well as vulnerable community assets. The Advisory Committee developed five goal categories and associated goal statements for the region as well, shown in **below:**

Table 1-1 below:

Table 1-1 Mitigation Plan Goals

Goal Categories	Mitigation Plan Goals
Community Planning	Reduce the impact of natural hazards by integrating natural hazard mitigation policies and practices into local community planning.
Flood Hazards	Minimize flood hazards in the region by maintaining continued compliance with the National Flood Insurance Program, adopting higher regulatory standards for new floodplain development, and implementing flood mitigation projects for existing flood prone structures.
Trees	Support proper care of healthy, native trees across the region to increase their resilience to natural hazards including severe storms, flooding, erosion, and extreme heat. Limit the impact of fallen and other hazardous trees by collaborating with utility companies and property owners to cut limbs and remove trees that pose threats to buildings, infrastructure and utility lifelines.
Regional Collaboration	Build capacity for natural hazard mitigation and climate adaptation at the local level through regional collaboration.
Public Awareness and Preparedness	Increase public awareness and preparedness for natural hazards by implementing community-based public education programs across the region.

After the regional goals were developed, SCRCOG staff and each jurisdiction developed their own mitigation actions. The Advisory Committee then came together to develop an implementation and plan maintenance process.

CHANGES SINCE THE PREVIOUS PLAN

D1. Was the plan revised to reflect changes in development? (Requirement §201.6(d)(3))
D2. Was the plan revised to reflect progress in local mitigation efforts? (Requirement §201.6(d)(3))
D3. Was the plan revised to reflect changes in priorities? (Requirement §201.6(d)(3))

The most significant change to the Planning Process was the inclusion of four additional jurisdictions, East Haven, Guilford, Milford and New Haven. The population in the region has remained relatively constant since 1970. Work along Long Island Sound in the form of the 2017 Southern Connecticut Regional Framework and several Coastal Resiliency Plans reflects an effort in the region to identify and prioritize projects to increase sustainability and resiliency in the region. The new South Central Region Plan of Conservation and Development 2018-2023 was reviewed for this Plan. It reflects the occurrence of higher density development in the region and its impact on employment, transportation, open spaces, etc.

Critical facilities are included in this Plan differently than in the previous Plan. Chapter 2 Planning Area Profile lists the types and numbers of critical facility in each jurisdiction, Chapter 4 Risk Assessment details each jurisdiction's critical facility in terms of risk. Including New Haven in the Plan, brought several regional critical facilities to light including Correctional Facilities, I-95, I-91, and the Port of New Haven. Finally, utilities played a larger role in the Planning Process than in the past. The Greater New Haven Water Pollution Control Authority (GNHWPCA) actively participated in meetings and has mitigation program funding pending for the East Haven Pump Station Resiliency Implementation Project.

CHANGES IN DEVELOPMENT

The Risk Assessment (Chapter 4) includes an update that reflects a few changes in methodology since the initial plan was completed in 2014, plus changes in development. Notable changes to the assessment method relative to the underlying data included incorporation of jurisdiction-provided critical facilities to the GIS database and incorporation of newly-created State-provided historic resource point data to the GIS database. With these two new layers in place, risks associated with hazards that possess spatial variability (floods, sea level rise, storm surge, dam failure, and wildfire) were re-assessed. Notable changes to the assessment method relative to the hazards included use of the Connecticut shoreline change atlas for the first time, use of the new State-supported sea level rise projections, use of the most up-to-date FIRM data, use of new dam failure inundation mapping (where available), and a revised wildfire assessment method that considered distances from firefighting water sources and lack of urban areas. By using the current State and town-provided parcel data for the entire risk assessment, inherent changes in development were included. Finally, the current version of HAZUS was used for the three hazards that are assessed by the program.

PROGRESS IN LOCAL MITIGATION ACTIONS

The Mitigation Strategy (Chapter 6) includes a comprehensive update that reflects changes since the initial plan was completed in 2014. These changes were made to ensure the strategy reflects current conditions and remains

relevant to local communities. Notable changes include the incorporation of previously adopted mitigation actions for the four (4) new participating jurisdictions incorporated into the regional plan, along with descriptive updates and revisions that reflect the implementation status of all mitigation actions from previous plans across the region. In addition, the Advisory Committee revisited, affirmed, and in some cases revised the mitigation goals and priorities for the plan based on several factors including changes in development patterns, updated risk assessment information, changes to existing capabilities or resources, public and stakeholder input, and progress in local mitigation efforts. Based on these regional goals and priorities, updated and new mitigation actions were identified, evaluated, and prioritized for SCRCOG and all participating jurisdictions, and four (4) new regional actions were also incorporated into the strategy in recognition that some actions are best accomplished through regional and multi-jurisdictional coordination.

CHANGES IN PRIORITY

The priorities of the Advisory Committee have not changed significantly since the original plan was developed, even though four additional jurisdictions joined the planning process. The most significant change is an emphasis on regional mitigation actions. Chapter 6 Mitigation Strategy includes a section dedicated to regional priorities.

DOCUMENT OVERVIEW

Below is a summary of the Hazard Mitigation Plan chapters including the appendices. The FEMA guidelines and requirements for each portion of this Plan are included in their respective chapters. The planning process closely adhered to FEMA guidelines and to the intent of these guidelines.

Chapter 2: Planning Area Profile

The Planning Area Profile chapter describes the demographics, geography, climate, transportation and land use of the region. It then goes into detail about each of the participating jurisdictions. To gather the jurisdiction specific information, the Planning Team conducted research including meeting with each jurisdiction, reviewing the town's website and their Plan of Conservation and Development. This chapter describes the characteristics of the region.

Chapter 3: Planning Process

The Planning Process chapter documents the methods and approach of the hazard mitigation planning process. The chapter summarizes the Advisory Committee meetings; the public workshops and the public outreach activities. This chapter guides a reader through the process of generating this Plan and reflects the open and inclusive public involvement process.

Chapter 4: Risk Assessment

The Risk Assessment chapter includes three main sections: hazard identification, hazard analysis and risk analysis. Best available data, including geographic information systems (GIS) and Hazus-MH, were used for this analysis. The chapter includes a sub-section for each of the fourteen participating jurisdictions emphasizing their unique risks. Finally, each jurisdiction section concludes with Problem Statements related to primary hazards of concern, geographic areas of concern and vulnerable community assets. The Problem Statements served as a stepping-stone for developing the mitigation actions presented in Chapter 6. Changes from the previous plan are indicated by green print.

Chapter 5: Capability Assessment

The Capability Assessment looks at each jurisdiction's ability to mitigate risk prior to and post-disaster. This chapter aims to answer two questions:

1. Does the plan document each jurisdiction's existing authorities, policies, programs and resources, and its ability to expand on and improve these existing policies and programs?[6]
2. Does the Plan address each jurisdiction's participation in the National Flood Insurance Program (NFIP) and continued compliance with NFIP requirements, as appropriate?[7]

The combination of the information contained in the Risk Assessment and the Capability Assessment leads to the analysis in the Mitigation Strategy chapter.

Chapter 6: Mitigation Strategy

This chapter provides a blueprint for reducing losses identified in the Risk Assessment. The chapter presents the overall hazard mitigation goals and then identifies mitigation actions in priority order for each of the participating jurisdictions. Where applicable, funding sources are identified, as are responsible persons or departments.

Chapter 7: Plan Implementation and Maintenance

The Plan Implementation and Maintenance chapter establishes a system and mechanism for periodically monitoring, evaluating and updating the Hazard Mitigation Plan.

Appendices

The Appendices include documentation regarding the planning process, such as Advisory Committee meeting presentations and Public Participation Survey results. In addition, resources such as the Project Fact Sheet are available. The HAZUS-MH results are included under separate cover due to their size.

[6] 44 CFR 201.6(c)(3)

[7] 44 CFR 201.6(c)(3)(ii)

CHAPTER 2. PLANNING AREA PROFILE

The South Central Region is one of nine Council of Governments in the State of Connecticut. Located within New Haven County in Southern Connecticut, the South Central Region is comprised of the following fifteen municipalities: Bethany, Branford, East Haven, Guilford, Hamden, Madison, Meriden, Milford, New Haven, North Branford, North Haven, Orange, Wallingford, West Haven and Woodbridge. These fifteen jurisdictions make up the South Central Regional Council of Governments (SCRCOG). SCRCOG brings together local governments to coordinate land use and transportation on a regional basis. This Multi-Jurisdiction Hazard Mitigation Plan Update covers fourteen of the fifteen SCRCOG municipalities (referred to as the "planning area"). The City of Meriden presently has their own hazard mitigation plan, and while not currently included in the planning area it is expected that it will become incorporated into this regional plan during future updates. This region is part of the Department of Emergency Management and Homeland Security's Region 2, a thirty-town area.

DEMOGRAPHICS

According to the 2015 SCRCOG estimated demographic data, the total population of the planning area is 510,157 (See **Table 2-2** for detailed population distribution by jurisdiction), or approximately 90 percent of the population of the South Central Region (570,596).[8] The most populated jurisdiction in the planning area is New Haven, with 130,612 residents, while the least populated is Bethany, with 5,533 residents. As shown in **Table 2-2**, the population in the region has remained consistent between 2010 and 2015.

Table 2-2 Population Distribution by Jurisdiction, 2017[9]

Jurisdiction	2010 Population[1]	2015 Population[2]
Bethany	5,563	5,533
Branford	28,026	28,074
East Haven	29,257	29,104
Guilford	22,375	22,392
Hamden	60,960	61,523
Madison	18,269	18,259
Milford	52,759	53,206
New Haven	129,779	130,612
North Branford	14,407	14,354
North Haven	24,093	23,937
Orange	13,956	13,946
Wallingford	45,135	45,089
West Haven	55,564	55,189
Woodbridge	8,990	8,939
Total	**509,133**	**510,157**

8 "South Central Region, CT: Demographic & Socioeconomic Trends." (2017). South Central Regional Council of Governments. Pg.7.
9 "South Central Region, CT: Demographic & Socioeconomic Trends." (2017). South Central Regional Council of Governments. Pg.7.

The South Central Region is 369 square miles and has an average population density of 1,546 people per square mile (based on 2011-2015 U.S. Census data).[10] As depicted in **Figure 2-1** the population density varies by jurisdiction, but is concentrated around New Haven and along major transportation corridors (depicted in **Figure 2-1**).

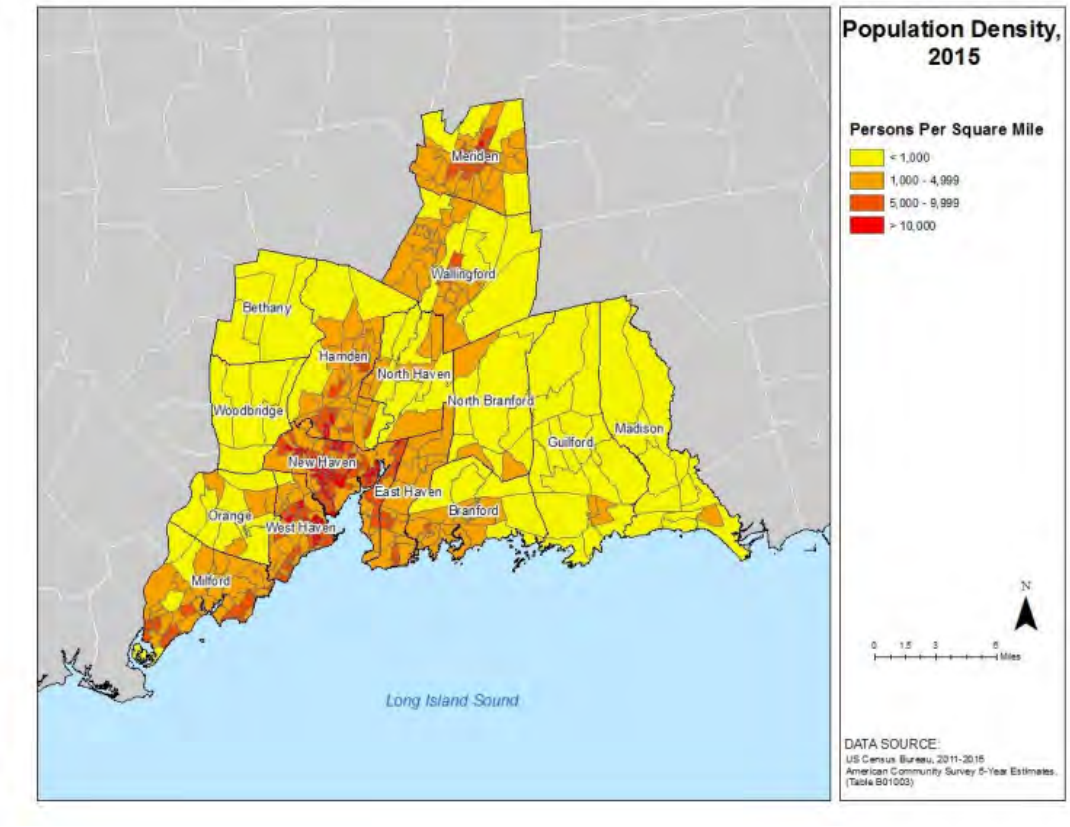

Figure 2-1 Population Density by Census Block Group, 2015[11]

The general age of people living in the planning area has a large distribution in both the baby boomer generation (born between 1946 and 1964) and people in their mid-20s. The overall state of Connecticut mirrors this trend, with a higher density of baby boomers than young adults, as shown in **Figure 2-2.** In both the planning area and the State of Connecticut, the female population is slightly dominant especially in the over 85 age group, which is consistent with the historical trend of females having a higher life expectancy than males in the United States.

10 "South Central Region, CT: Demographic & Socioeconomic Trends." (2017). South Central Regional Council of Governments. Pg.7.
11 "South Central Region, CT: Demographic & Socioeconomic Trends." (2017). South Central Regional Council of Governments. Pg.8.

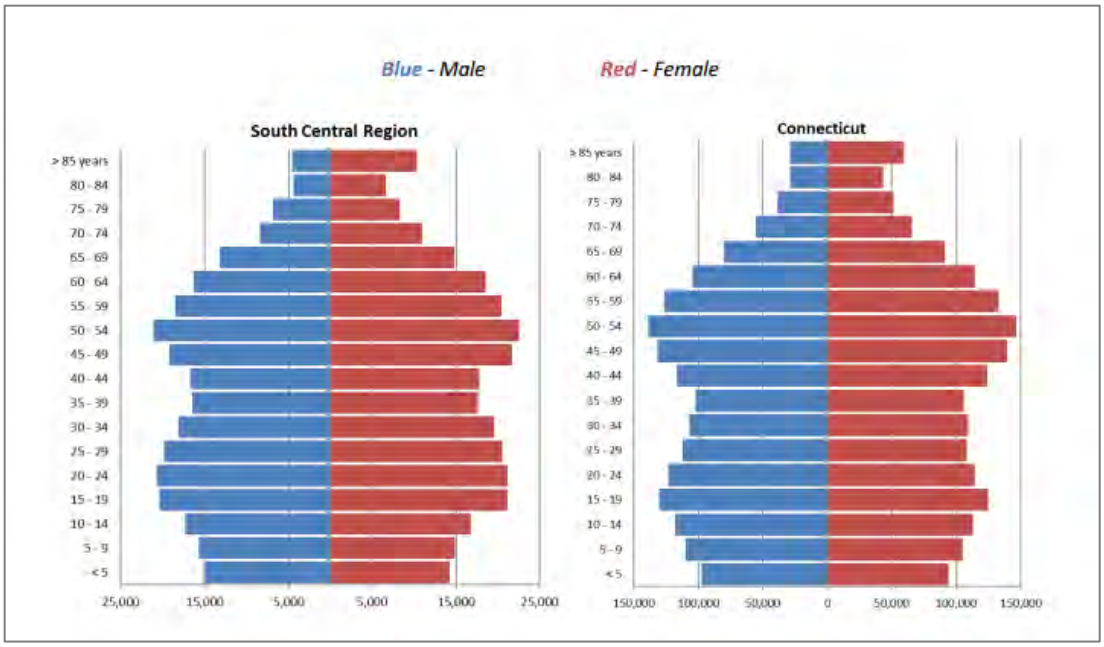

Figure 2-2 Population Distribution by Age, 2015[12]

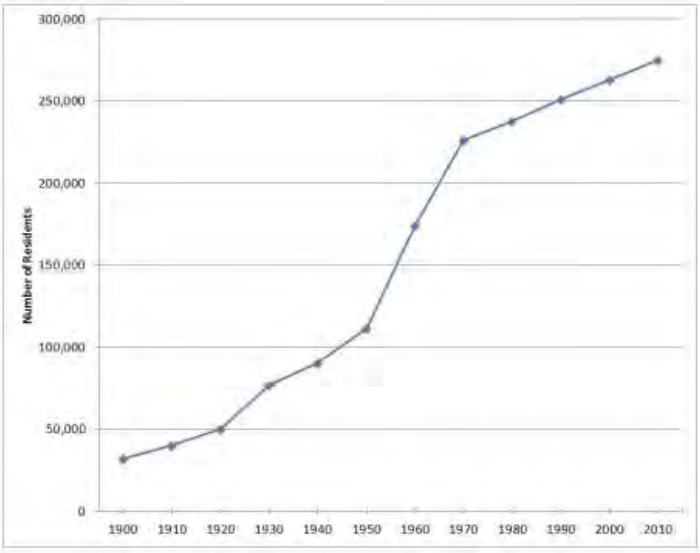

Figure 2-3 SCRCOG Population Change from 1900-2010[13]

12 "South Central Region, CT: Demographic & Socioeconomic Trends." (2017). South Central Regional Council of Governments. Pg.9.
13 Decennial Census 1900-2010. (2010). U.S. Census Bureau.

Population in the planning area has remained relatively constant since the 1970 U.S. census, with only a mild increase of about 5% between decennial census years (**Figure 2-3**). The largest increase in population occurred between 1950 and 1960 (an increase of 56%).

In 2015, the entire SCRCOG region had a median household income of $65,662 and the unemployment rate that same year was 5.8%, which is a significant and steady drop from the unemployment rate in 2010, which was over 9.0%.[14] Thirty-six percent of the region's residents have attained a bachelor's degree or higher. The State of Connecticut ranks fourth in the nation with 37.58% of the population over the age of 25 having a bachelor's degree or higher.[15]

GEOGRAPHY

The South Central Region is bordered by the Long Island Sound on the south. The southernmost part of the planning area includes the towns of Branford, Madison, Orange and West Haven. These towns are situated among the Coastal Lowlands, a narrow strip of level shore that runs along the Long Island Sound. The coastline of the Long Island Sound is dotted with many small coves and inlets and varies from sections of sandy beach to rocky bluffs to saltwater marshes. Researchers have graded the health of the Long Island Sound as a 'B+' on water quality. Towns such as, Bethany, Hamden, North Branford, North Haven, Wallingford and Woodbridge have elevations at or near sea level and are characterized by a gently to moderately sloping landscape of nutrient-rich farming soil. The South Central Region rests mainly on the well-drained Connecticut Valley Lowlands soil that has been formed by glacial stratified drift, a type of sediment that was deposited by glacial melt water streams.

Figure 2-4 shows the South Central Region's three major rivers: the Housatonic, the Hammonasset, and the Quinnipiac Rivers. The Housatonic River flows from western Massachusetts south to Connecticut and into Long Island Sound. Many people use the Housatonic River for canoeing and other recreational activities. The Housatonic River estuary is the most consistent producer of seed oysters in the northeast, providing a vital part of Connecticut's commercial shellfish industry.[16] The Quinnipiac River bisects the State of Connecticut from north to south direction and forms the Central Lowlands region. The Quinnipiac River Watershed extends into Wallingford and North Haven and flows thirty-eight miles from its headwaters in Plainville to its mouth in New Haven. The Hammonasset River helps define the region's southeastern boundary. The Hammonasset travels about twenty-one miles from Durham to Long Island Sound near Hammonasset Beach State Park in Madison. All three rivers empty into the Long Island Sound.

14 "South Central Region, CT: Demographic & Socioeconomic Trends." (2017). South Central Regional Council of Governments.
15 "South Central Region, CT: Demographic & Socioeconomic Trends." (2017). South Central Regional Council of Governments. Pg.13.
16 "A Paddling Guide to the Housatonic River in Connecticut." (2012). The Housatonic Valley Association.

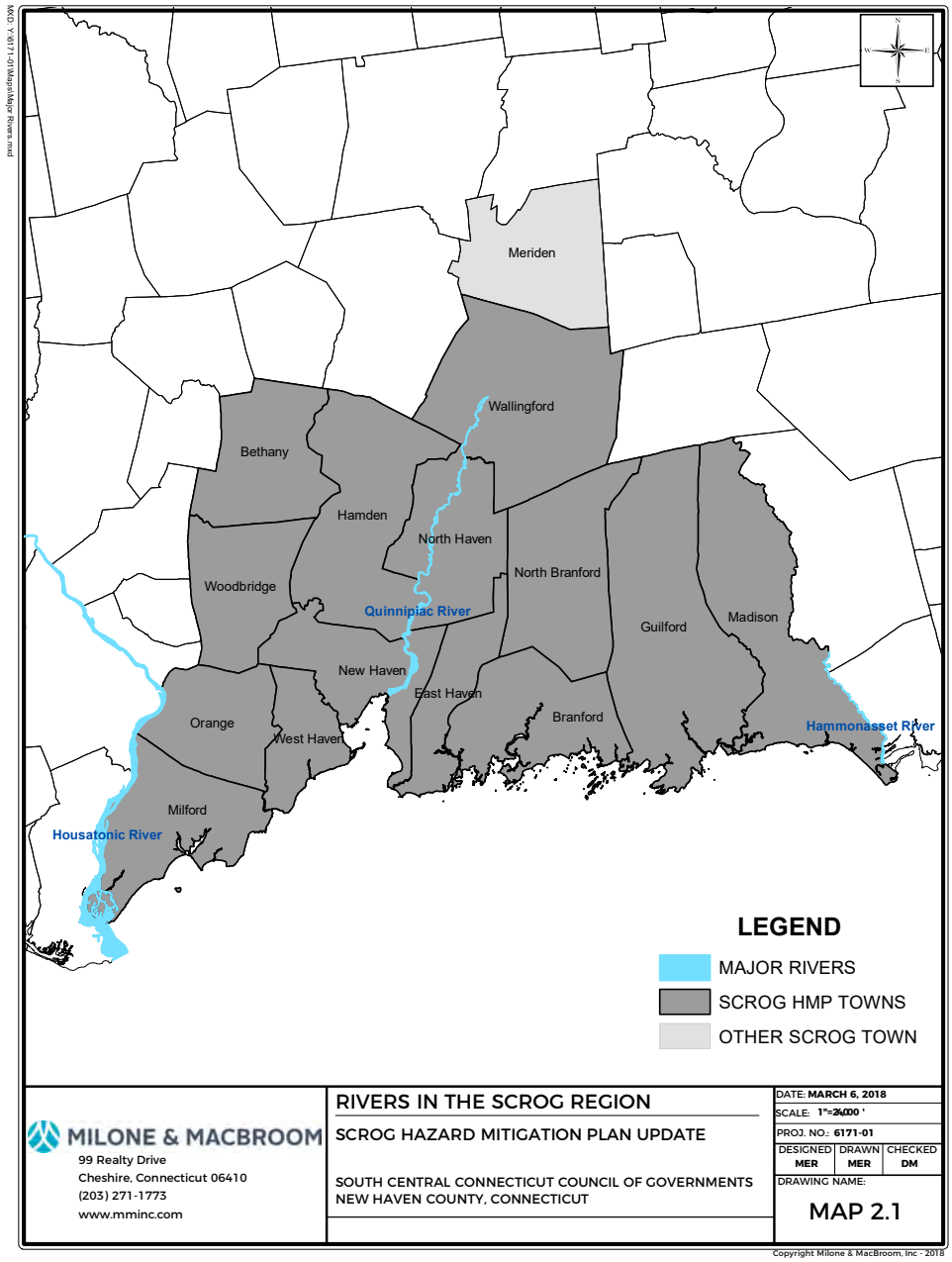

Figure 2-4 Rivers in Planning Region

Overall, the physical characteristics of the region range from marshland to farmland to urban areas. Much of the coastal land, including areas within floodplains, have developed into densely populated areas of commerce,

industry and residence.[17] The Long Island Sound also supports the region's growing commercial and recreational interests, including shell fishing, sport fishing, boating and swimming. As one of the largest estuaries in the United States, the Long Island Sound is also home to a diversity of marine animal and plant life.[18] Considerable efforts have been made by the State of Connecticut and its coastal region to protect the Sound's tidal wetlands as an irreplaceable natural resource.[19]

Recently the region along the Long Island Sound, including Milford, West Haven, New Haven, East Haven, Branford, Guilford, and Madison municipalities have worked with three other coastal municipalities (Bridgeport, Fairfield, Stratford) to develop the 2017 Southern Connecticut Regional Framework for Coastal Resilience in Sothern Connecticut (Regional Framework). This Regional Framework constructed by the SCRCOG, the Metropolitan Council of Governments (MetroCOG), and the Nature Conservancy (TNC) works to comprehensively "catalogue, assess, prioritize and design resilience opportunities to help reduce risk…and increase the viability of natural resources along approximately 30% of Connecticut coastline."[20] The project proposed the following four components:

1. A comprehensive assessment of the coastline and adjoining watershed
2. Conduct community resilience planning meetings and workshops
3. Define the scope and design of the highest priority projects to reduce risk
4. Create a Final Report as an immediate and long-term guide for future mitigation to advance the Regional Resilience Frameworks.

More information about this project and Coastal Resilience Planning can be found in Chapter 4 of this plan, and on the SCRCOG website (http://scrcog.org/regional-planning/coastal-resilience/).

All of the municipalities participating in the plan mentioned concerns regarding trees and their negative impact on utilities and roads when they come down during extreme hazard events. In addition, a number of municipalities mentioned they have a huge number of trees that have been impacted by the Emerald Ash Borer beetle. According to DEEP the Emerald Ash Borer "is a small, green beetle that belongs to a large family of beetles known as the buprestids, or metallic wood boring beetles. Because the larval EAB feeds on the phloem and cambium of the tree, and because its numbers in an area tend to build up rapidly, infestation by EAB usually leads to the death of trees that are infested, often within 2-3 years." According to a May 31, 2013 article in the Ridgefield Press, "this destructive insect was first detected in Connecticut in the town of Prospect in July 2012 and was subsequently found in eight other towns, all in New Haven County, as part of surveys conducted by Agricultural Experiment Station, The Department of Energy and Environmental Protection (DEEP), and the University of Connecticut Cooperative Extension or from reports by the public." Each jurisdiction has a tree warden who has the authority to determine health and fate of trees. Some municipalities reported that they are removing multiple diseased trees each week and many reported needing more funding, equipment and staff to manage the removal of diseased trees. Several jurisdictions have included mitigation actions related to trees in this plan. In the following section

17 "FEMA Flood Insurance Study, New Haven County, CT." (2010). Federal Emergency Management Agency.
18 "Connecticut Statewide Comprehensive Outdoor Recreation Plan." (2016). Connecticut Department of Energy and Environmental Protection. Pg.11
19 "Living on the Shore Tidal Wetlands." (2016). Connecticut Department of Energy & Environmental Protection.
20 "Southern CT: Regional Framework for Coastal Resilience." (2017). South Central Regional Council of Governments – MetroCOG, Nature Conservancy.

related to utilities, information is included from Eversource and United Illuminating regarding their work in the region to manage trees in relation to power lines.

While trees do pose a threat to roads and utility lines when they are impacted by natural hazards, trees also prevent disasters. Trees have the ability through their root systems to prevent erosion from rain and flooding. Trees also provide shade which can cool temperatures during periods of extreme heat or drought. The Hamden Tree Commission participated in the Regional Public Meeting during the Planning Process as well as in several other meetings related to the plan. They are working hard to educate their community and others about the value of trees in Connecticut. They would like to play a larger role in decisions made regarding trees in their communities. They mentioned that perhaps for all trees removed a certain number of new trees could be planted. According to a letter from Diane Hoffman of the Hamden Tree Commission, "it is important that we look at the full cost of removing our trees and the cost savings trees provide by controlling flooding and soil erosion, cooling our homes in the summer, providing homes for wildlife and birds who in turn eat insects, creating oxygen so we can breathe and cleaning our air."

CLIMATE

The South Central Region has relatively mild winters and warm summers. Average temperatures for midsummer are between 63˚F (daily low) and 84˚F (daily high). Midwinter temperatures range from 18˚F (daily low) to 35˚F (daily high). The average annual precipitation is about forty-seven inches. The region experiences westerly winds and is subject to cyclonic disturbances—twenty to thirty mile per hour winds that are often accompanied by heavy rain—that follow the prevailing west to southwest winds. The region is also affected by northward moving coastal storms that can reach hurricane intensity during the summer and fall seasons.[21]

The coastal communities in the planning area – Milford, West Haven, New Haven, East Haven, Branford, Guilford and Madison – are located on Long Island Sound. The inland communities in the planning area are Orange, Woodbridge, Bethany, Hamden, North Haven, Wallingford and North Branford. On average, the coastal communities receive less rainfall and less snowfall than the inland communities. The average high and low temperatures tend to be approximately the same for the coastal communities as the inland communities

TRANSPORTATION

Transportation resources in the South Central Region of Connecticut include railways, waterways, roads and natural gas pipelines. Among these are two major interstate highways (I-91 and I-95), Tweed New Haven Regional Airport, which serves one hundred thirty destinations around the globe, a major rail hub serving Amtrak, Metro-North, and Shoreline East and the Port of New Haven, which is the State's largest deep-water port.[22] **Figure 2-5** shows the location of the major transportation corridors in the region. Over 75% of the South Central Region workers are commuters who drive alone in 2015, with an overall decrease in commuters from 2000. New Haven

[21] "FEMA Flood Insurance Study, New Haven County." (2010). Federal Emergency Management Agency.
[22] "South Central Region, CT: Demographic & Socioeconomic Trends." (2017). South Central Regional Council of Governments. Pg.24.

residents use the most public transportation at 13.3%, with the rest of the Region falling below the national average of 9.5%.[23]

The planning region contains a variety of transportation options, making coordination and development a top priority for the region. SCRCOG hosts monthly meetings to facilitate interagency communication and cooperation regarding transportation between municipalities and state and federal agencies. The South Central Regional Council of Governments develops and updates the regional Long Range Transportation Plan (LRTP), which "addresses broad goals for the transportation needs of the region."[24] The latest LRTP, which covers the years between 2015 to 2040, lists the following major goals: travel options, transportation funding, policy guidance, regional solutions, linking land use with transportation, aging infrastructure, economic vitality, congestion management process, preservation of existing transportation resources and climate change.[25] The LRTP does not address natural hazards but it does seek to reduce congestion, improve quality of transportation, and account for the challenges climate change presents. Environmental permitting for transportation rests primarily at the state level; however, the LRTP mentions that review by "jurisdictions will provide the potential for local input to the state permitting process, working toward the goal of a better environmental outcome for every transportation project."[26] For further information about the transportation systems present in the planning region see the 2015 updated LRTP found on the SCRCOG website (http://www.scrcog.org).

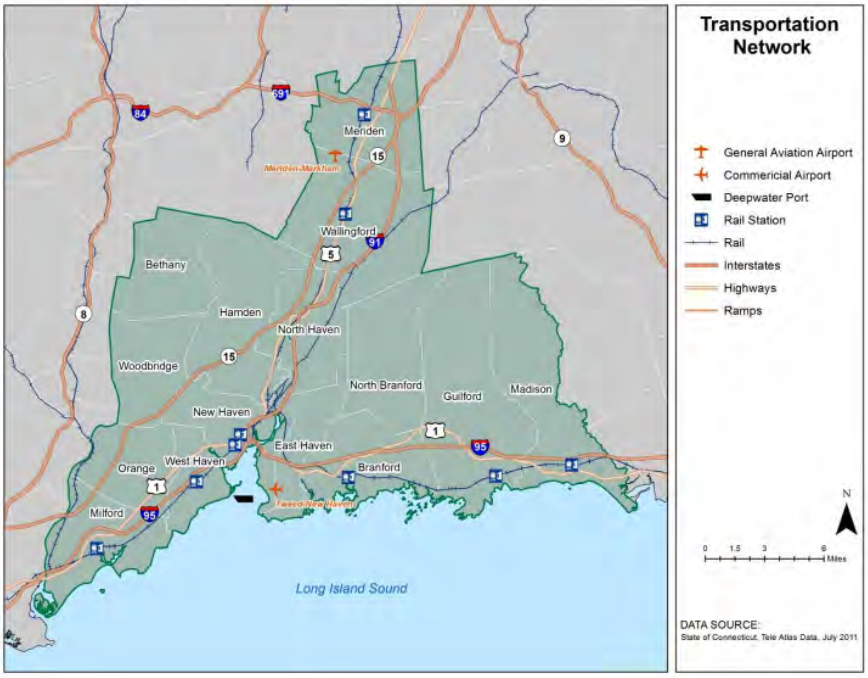

Figure 2-5 Major Transportation Networks in SCRCOG Region[27]

[23] "South Central Region, CT: Demographic & Socioeconomic Trends." (2017). South Central Regional Council of Governments. Pg.25.
[24] "South Central Regional Long Range Transportation Plan 2015-2040." (2015). South Central Regional Council of Governments.
[25] "South Central Regional Long Range Transportation Plan 2015-2040." (2015). South Central Regional Council of Governments.
[26] South Central Regional Long Range Transportation Plan 2015-2040." (2015). South Central Regional Council of Governments.
[27] "South Central Region, CT: Demographic & Socioeconomic Trends." (2017). South Central Regional Council of Governments. Pg.24.

LAND USE

The South Central Region updated its Plan of Conservation and Development (POCD) in 2008 (amended in July 2009). The POCD "provides a general regional policy guide for conservation and development that balances higher density development in the region's existing employment, transportation, and housing corridors with context-sensitive reinvestment in historic town centers and villages while also protecting the open spaces, forests, and agricultural lands that contribute to the region's high quality of life and sense of place."[28] The South Central Region: Plan of Conservation and Development 2018-2023 DRAFT was reviewed for this plan's update.

The May 2017 update to the POCD reviewed the existing plan, local changing demographics, and direction of the POCD in the upcoming years.[29] For the purposes of this plan, the Municipal POCD Review table on p.71 of the draft South Central Region: Plan of Conservation and Development 2018-2023 DRAFT was used to identify the main goals, objectives and strategies from the jurisdiction specific Plans of Conservation and Development. The State of Connecticut's Conservation and Development Plan (2018-2023) is in the process of being updated, which will help guide the municipalities to update their own plans. In the South Central Region, there is a strong connection between transportation and development patterns. SCRCOG jurisdictions are continually working to balance development and their transportation needs in a way that promotes the region's broader long-term goals.[30] The region directs development toward areas that:

- Preserving open space and historic/cultural heritage structures
- Diversifying housing options
- Transit and Village Center oriented development
- A Healthy economy with a focus on education
- Reinvest in underdeveloped/vacant parcels
- Develop multimodal transportation connections, and enhance walking/bike path network

CRITICAL FACILITIES

Critical facilities in the South Central region of Connecticut include federal, state and local facilities. For this plan, emphasis was placed on identifying and mapping critical facilities in each of the fourteen jurisdictions included. Critical facilities for each jurisdiction are named in the Risk Assessment and may include health care facilities, churches, schools and local government buildings. The 2014 Connecticut Natural Hazard Mitigation Plan Update, identified these fourteen jurisdictions to have the critical facility types and numbers shown in **Table 2-3.**

[28] "Plan of Conservation and Development: South Central Region." (2009). South Central Regional Council of Governments.
[29] "South Central CT Region Plan of Conservation & Development 2018 Update." (2017). South Central Regional Council of Governments.
[30] "South Central CT Region Plan of Conservation & Development 2018 Update." (2017). South Central Regional Council of Governments.

Table 2-3 Critical Facility Types by Jurisdictions (2014)

Jurisdictions	Correctional Institutions	EMS	Fire Stations	Health Dept.	Law Enforcement	Storage Tank Farm	Water & Waste Water Treatment Infrastructure – Privately Owned	Water & Waste Water Treatment Infrastructure – Jurisdiction Owned
Bethany		2	2		1			
Branford		5	5	1	1			1
East Haven		3	4		1	1		
Guilford		1	5	1	1			
Hamden		7	7		1			
Madison		3	2	1	1			
Milford		4	4	1	1		1	2
New Haven	2	1	10	1	8	9		2
North Branford		4	4		1		1	
North Haven		4	4	1	1			
Orange		2	2	1	1			
Wallingford		5	6	1	1			1
West Haven		10	10	1	2			1
Woodbridge			1		1			

In New Haven's jurisdiction meeting held during the Planning Process, participants in the meeting emphasized how New Haven has several regionally important critical facilities. The mentioned the Port of New Haven, the New Haven Rail Yard as well as the interstate highway system of I-95 and I-91. These facilities often receive attention before smaller local critical facilities which is a concern to New Haven.

The Port of New Haven is an integral component of the regional economy and transportation network. The port has been used to promote shipping freight and commerce since the founding of the New Haven settlement in the 1600s. In 2007, the Port Authority adopted a Strategic Land Use Plan to ensure the safety and success of the port.[31] The US Army Corps of Engineers is currently considering deepening the channel from 35 feet to 42 feet to give the area a competitive edge.[32] The Pearl Harbor Memorial Bridge provides easy access to the port area, and the Tomlinson Bridge connects the rail service to the port.

The Tweed-New Haven Airport began flight service in 1931, the first plane landing 20 years prior, and has proved useful in past disasters as a distribution service.[33] According to the Federal Aviation Administration, in 2017 Tweed-New Haven Airport serviced over 36,000 flights, half of which were local flights.[34] The Airport covers 394 acres, at 12 feet above sea level, with two asphalt runways.[35] Tweed Airport is currently proposing a reconstruction and expansion project.[36]

[31] "Port Authority." (2017). The City of New Haven.
[32] O'Leary, Mary. (2015). "New Connecticut Port Authority to focus on boosting maritime economy." New Haven Register.
[33] "Tweed Airport Timeline." (2017). Tweed New Haven: Southern Connecticut's Airport.
[34] "Air Traffic Activity System (ATADS)." (2017). Federal Aviation Administration.
[35] "Tweed-New Haven." (2017). Airport IQ 5010.
[36] "Future of Tweed: Letter from the Mayor of New Haven." (2015). Tweed New Haven: Southern Connecticut's Airport.

NEIGHBORING REGION

The South Central Region of Connecticut is one of nine Councils of Governments in Connecticut, and is bordered to the east by Lower Connecticut River Valley, Metropolitan in the west, and Naugatuck Valley in the north.[37] New Haven lies at the center of SCRCOG, which is about 40 miles southwest of Hartford, CT and 80 miles from New York, NY. The region lies against the Long Island Sound, with Long Island 50 miles from New Haven by ferry. Geographically, the region is bordered by forest and agriculture with most of the neighboring population lying north of New Haven and on the coastline. The South Central Region is part of the New York – New Haven – Springfield transportation corridor that mainly follows Interstate 95 and Interstate 91.[38]

UTILITIES

The Regional Water Authority (RWA) is the primary water service provider,[39] except for Guilford and Madison, which are serviced by the CT Water Company in nearby Clinton, CT.[40] Wallingford supplies water to itself through a municipal water division.[41] Southern Connecticut Gas (SCG) and Yankee Gas Service Company currently provide the region with Natural Gas, though over half of Connecticut households use oil and petroleum products to heat their homes.[42]

The Greater New Haven Water Pollution Control Authority (GNHWPCA), was formed as an independent regional sewer authority in 2005 by an act of the legislature and concurrent ordinances adopted by each of its constituent municipalities. The purpose of the GNHWPCA is to own, use, equip, repair, maintain, supervise, manage, operate and perform any act pertinent to the collection, transportation, treatment and disposal of sewage with respect to its constituent municipalities. GNHWPCA's constituent municipalities include New Haven, East Have, Hamden, and Woodbridge. GNHWPCA also maintains an Emergency Response Plan and a Business Continuity Plan.

The GNHWPCA applied for and received funding from a FEMA HMGP grant to implement resiliency improvements at four coastal pump stations in East Haven. The East Haven Pump Station Resiliency Implementation Project addresses flood resiliency at the GNHWPCA's a) Cosey Beach Pump Station, b) Minor Road Pump Station, c) Meadow Street Pump Station, and d) Farview Road Pump Station. Funding approval is pending for a project in New Haven called the New Haven Pump Station Resiliency Implementation Project, which will address flood resiliency improvements at the a) East Street Pump Station, b) Boulevard Pump Station, c) Fort Hale Pump Station, and d) ESWPAF Operations Building. More information about these projects is included in the Appendix.

New Haven has invested heavily in its sewer system and how it is impacted by stormwater. The Connecticut Institute for Resilience & Climate Adaptation (CIRCA) has a project "New Haven – Assessing Impacts of Tides and Precipitation on Downtown Storm Sewer System," uses real-time depth and flow monitoring data to assess the

[37] "Welcome to South Central Regional Council of Governments." (2017). South Central Regional Council of Governments.
[38] "The Northeast Corridor." (2017). Northeast Corridor Commission.
[39] "Service Area Map." (2017). South Central Connecticut Regional Water Authority.
[40] "Offices and Hours." (2017). Connecticut Water.
[41] "Water and Sewer Divisions." (2017). Wallingford Connecticut.
[42] "Utility by Town List." (2014). State of Connecticut.

increasing need for resiliency planning due to the increase in precipitation intensity and volume due to climate change.[43]

Eversource provides gas and electricity to Bethany, Branford, Guilford, Madison, and Meriden. United Illuminating provides electrical service to the remaining towns in the planning area. Wallingford has its own municipal-owned electric service, so it receives only gas from Eversource. Eversource reports to the Public Utilities Regulatory Authority (PURA) on a regular basis and has budgeted for four types of system resiliency.

1. Vegetation Management
2. Structure Hardening
3. Electrical System Hardening
4. System Automation

In terms of mitigating risk caused by trees, Eversource maintains a four-year cycle of tree trimming in the region. They have begun "enhanced tree trimming" which means they are working ground-to-sky. They are also hardening circuits, conducting performance analysis and transitioning to more resistant wiring. In terms of structures, they now use poles that are taller and larger and use attachment hardware rated for Category 3 Hurricane Winds. Eversource now has smart grid automation devices that can section outages to smaller areas by re-routing power. In terms of flood mitigation, Eversource has removed substations in the 100-year and 500-year flood zones, or installed barriers around these substations. The barriers protect the substation from storm surge from up to a Category 3 Hurricane. By implementing these four resiliency measures, Eversource has seen improvements in system interruption and outages.

Eversource works closely with the University of Connecticut (UCONN) through the Eversource Center. This center conducts research and analysis to predict outage events. They do a lot of the disaster modeling and forecasting for Eversource. Eversource considers forecasting as a crucial part of resource planning and outage response. The storm modeling done by UCONN is helping Eversource make the electrical grid more efficient. UCONN also does forestry modeling which enables Eversource to effectively thin the forest so it is more resilient to wind.

Similar to Eversource, United Illuminating has a vegetation management program to reduce the amount of vegetation that threatens power lines during hazards such as high winds. United Illuminating works closely with communities to survey and determine tree work that may be required to maintain a "utility protection zone" and to reduce the threat of downed power lines. United Illuminating shared their Emergency Response Plan, July 1, 2017 with the Planning Team. The plan outlines the response activities and management structure for emergency incidents. The Emergency Response Plan is based on the Incident Command System (ICS). Connecticut Public Utilities Regulatory Authority (PURA) which governs the work of Eversource, United Illuminating and the Wallingford Utility, requires that each utility maintain an Emergency Response Plan and follow the ICS system.

[43] UCONN, https://circa.uconn.edu/new-haven-stormwater/

BETHANY

According to the Town website, "Bethany was first settled in 1717 but it was not until May 1832 before Bethany separated from Woodbridge to become incorporated as a town."[44] Bethany is located between New Haven and Waterbury on State Routes 63 and 69. Bethany's moto is 'Rural is Beautiful' with over 6,000 acres of open space. The town clearly meets the criteria for "rural" established in the State Plan of Conservation and Development. A Board of Selectman, Town Meeting and Board of Finance govern the Town of Bethany.[45] The high amount of forested land in Bethany presents a major concern for blocked roadways and damaged property by fallen trees during major storms.

DEMOGRAPHICS

The Town of Bethany is a sparsely populated agricultural community situated in the northwest corner of the region. It covers twenty-one square miles, at an elevation of 574 feet, and is home to 5,533 residents, with a population density of 260 people per square mile. According to recent data, 99% of their 2,060 housing units are occupied, they have a 4.3 percent unemployment rate in 2015 and the median household income is $97,254. Over fifty percent of the Town's residents have attained a four-year college degree or higher, which is up 2.2% since 2000.[46]

GEOGRAPHY AND WATER

The Town encompasses many forested areas. Residents appreciate the outdoors and enjoy horseback riding, which explains their investment in preservation of the Town's many open spaces as natural sanctuaries and sites of historic significance. Bethany also has several reservoirs and a major waterway, the Naugatuck River, which runs north to south just one mile from the western border. The river is flood prone, but the Town has sufficiently sized culverts and a dam that helps alleviate flooding concerns. One of the Land Use Goals in Bethany is "to protect Bethany's role in the region as a public water supply watershed."[47] Their largest protected park, Veterans Memorial Park (165 acres), includes the man-made Hockanum Lake.[48]

TRANSPORTATION

The main roads running through the Town are Routes 42, 63, and 69. The town's former airport was built in 1923, and was one of the oldest airports in New England that closed in 1966.[49] The old airport hangar has been replaced with a new structure, when upon completion will have the capability for use as an emergency shelter. The Tennessee Gas Pipeline Company operates a natural gas transmission pipeline that runs through the southeast

[44] "About Bethany." (2017). Bethany Connecticut.
[45] "About Bethany." (2017). Bethany Connecticut.
[46] "South Central Region, Connecticut: Demographic & Socioeconomic Trends." (2017). South Central Regional Council of Governments.
[47] "South Central CT Region Plan of Conservation & Development 2018 Update." (2017). South Central Regional Council of Governments.
[48] "Veterans Memorial Park." (2017). Connecticut: Still Revolutionary.
[49] Freeman, Paul. "Bethany Airport, Bethany CT." (2017). Abandoned & Little-Known Airfields: Western Connecticut.

corner of town.[50] In 2015, less than 5% of Bethany residents use public transportation, as the Town is so rural and 91% of residents commute to adjacent municipalities for work (up from 84% in 2000).[51]

LAND USE AND DEVELOPMENT

The Town of Bethany is located outside of the region's main commercial corridor. According Bethany's Town Plan of Conservation and Development 2010, their guiding principles are the following:

- To maintain the unique rural character of Bethany which has been achieved over time and which should be preserved for the future.
- To ensure orderly development that is in harmony with Bethany's unique natural environment and which encourages the use of alternative energy sources and green building principles.
- To encourage a pattern of land use which promotes a high quality of rural life for all the residents of Bethany and protects Bethany's role as a source of pure drinking water and a recreational and environmental greenbelt for surrounding communities, as well as for its own residents.
- To limit the development of land in Bethany to a form and intensity that does not exceed the land's natural capacity for on-site water supply and sewage disposal, and is compatible with the Town's rural character.
- To promote an approach to land use that is consistent with the core principles of sustainable development.[52]

The western half of Bethany is a suburban residential area, while the remainder of the Town is a rural residential area and has a higher incidence of agricultural land use. The rural residential area is also an area for regional water supply. Both rural and suburban residential areas with larger lot sizes can be out of range for access to public utilities. The residents of Bethany have no municipal water or sewer service and rely on wells as a source for both grey water and potable water. During the jurisdiction meeting in Bethany, it was mentioned that 99% of residents rely on well water. They would like to turn the Old Airport hangar into a shelter but there is not a generator on site.

BRANFORD

The area of land now known as Branford was purchased from the Mattabesech Indians in 1638. It was originally called "Totoket" and later became Branford, after the Town of Brentford, England.[53] Branford is a 22 square mile coastal community located on Long Island Sound that has over 20 miles of coastline. The Town lies between East Haven and Guilford, and includes the Thimble Islands, a small archipelago in Long Island Sound that attracts tourism. Branford protects its natural resources and inland wetlands, while developing into a thriving residential, commercial and industrial community. A Board of Selectman, Town Meeting and Board of Finance govern the Town of Branford.[54]

[50] "Kinder Morgan in Connecticut." (2015). Kinder Morgan.
[51] "South Central Region, CT: Demographic & Socioeconomic Trends." (2017). South Central Regional Council of Governments. Pg.25.
[52] "Town Plan of Conservation and Development for Bethany, Connecticut." (2010). Bethany, Connecticut. P.9.
[53] "Welcome to the Town of Branford, Connecticut." (2017). Branford, Connecticut; and "History of Branford." (2017). Branford, Connecticut.
[54] "Government." (2017). Branford, Connecticut.

DEMOGRAPHICS

According to 2015 data estimates, Branford has a year-round population of 28,074, and 13,967 occupied housing units (up from 12,414 in 2010), most of which are located on the western coast. Housing in Branford has increased by over 75% since 1970 (6,600 housing units). Only 60% of residential units are owner occupied, which correlates with heavy summer tourism on the Connecticut Coast. The jurisdiction has a median household income of $71,938 and 43% of its residents have attained a bachelor's degree or higher. The Town has an unemployment rate of 4.7% in 2016, the lowest it has been since 2010 when unemployment was at 8.3%.[55]

GEOGRAPHY AND WATER

The Town of Branford offers a diversity of settings from quaint seaside villages to heavy industrial and commercial districts to densely wooded areas and farmlands. Branford is bordered to the West by Lake Saltonstall and the Metacomet Ridge, whose southern terminus resides in Branford. The coastline is decorated with two main harbors – Stony Creek Harbor and Branford Harbor.[56] A unique feature of Branford is the Thimble Islands, an archipelago of small bedrock islands located in the Long Island Sound at the southeast corner of Branford. There are about one hundred homes on the islands, mostly occupied during the summer months.[57]Branford is susceptible to flooding during high tides and rain events from the Branford River and other waterways nearby.

TRANSPORTATION

Interstate 95 and U.S Route 1 run through the Town of Branford and the Shoreline East Rail Service has a stop in Branford. Furthermore, the Tweed International Airport is 3 miles west of the Town. However, this town does not have a regular bus service. Seventy-one percent of Branford's population Commutes to a different jurisdiction for work (down from 84% in 2000), and only 3.4% use public transportation.[58]

LAND USE AND DEVELOPMENT

Land use in Branford varies from suburban areas with single-family home lots (up to 40,000 square feet in size), multi-family dwellings located along the shoreline, commercial mixed-use areas, and industrial land uses.[59] The 2008 Branford Plan of Conservation and Development is organized around three main themes, conservation, development, and infrastructure. In the South Central Region: Plan of Conservation and Development 2018-2023 DRAFT, Branford wishes to "protect the physical environment and manage growth to preserve the town's heritage and character."[60] The jurisdiction also contains Sybil Creek Landfill on the coast. Several land use mitigation measures have developed from the SCRCOG 2017 Coastal Resilience Plan, such as revitalizing Stony Creek Beach and the Jarvis Creek Estuary, stabilizing coastline, and updating roadways along the coast.[61]

[55] "South Central Region, CT: Demographic & Socioeconomic Trends." (2017). South Central Regional Council of Governments.
[56] "Parks & Recreation Facilities." (2017). Branford, Connecticut.
[57] Stowe, Stacy. (2006). "Living Half a Mile off the Coast." The New York Times.
[58] "South Central Region, CT: Demographic & Socioeconomic Trends." (2017). South Central Regional Council of Governments. Pg.25.
[59] "South Central Region, CT: Demographic & Socioeconomic Trends." (2017). South Central Regional Council of Governments. Pg.19.
[60] "South Central CT Region Plan of Conservation & Development 2018 Update." (2017). South Central Regional Council of Governments.
[61] "Southern CT: Regional Framework for Coastal Resilience." (2017). South Central Regional Council of Governments, MetroCOG, Nature

Since the last mitigation plan, many land use changes have been made. The Community Center now includes the Senior Center and the Foot Park is now publicly-owned. The Atlantic Wharf has developed into a multi-use site with housing and commercial spaces. Two additional subdivisions were built: the Cornfield Estates built on land previously used for agriculture; and the commercial property at Summit/West Main that became residential. In addition, Branford has added two solar farms.

EAST HAVEN

East Haven is part of the Greater New Haven area, lying just east of the city. The Town was originally purchased from the local Quinnipiac tribe in 1638 as part of New Haven, and was established as a separate town in 1707.[62] Previously called "The Iron Works Town," the economy was founded with the first ironworks in Connecticut, but has since developed into a thriving urban and suburban community.[63] Recently the downtown area has been revitalized to put emphasis on its rich history. The jurisdiction is bordered by the Quinnipiac River and Long Island Sound, so it falls under the SCRCOG 2017 Coastal Resilience Plan. East Haven is governed by a Mayor and Town Council since 1969.[64]

DEMOGRAPHICS

East Haven has a current population of 29,104 with a population density of 2,377 people per square mile. Only 21% of residents have a Bachelor's Degree or higher, which is up by 3.6% since 2000. The median income in East Haven is $31,781 and 9.8% of residents live below the poverty line, and unemployment at 5.9% (down from a peak of 10.4% in 2010). Sixty-four percent of East Haven's 12,400 housing units are owner-occupied, with 26% of housing renter-occupied.[65]

GEOGRAPHY AND WATER

East Haven lies in the center of the planning region, with the Quinnipiac River acting as a western border with New Haven. On the eastern side, East Haven is bordered by Lake Saltonstall, a popular recreational destination that divides East Haven from Branford. The Town consists of 13.4 square miles, with approximately 2 miles of coastline along Long Island Sound. East Haven Mainly consists of a semi-urban community, but there are some small parks and water features.

TRANSPORTATION

Interstate Highway 95 runs from east to west through the Town of East Haven. The closest rail station lies outside the town in New Haven. The Connecticut Transit Bus Company serves the town. The Tweed New Haven Airport lies

Conservancy.
[62] Hughes, Sarah E. (1908). "History of East Haven."
[63] "Early History." (2017). Town of East Haven Connecticut.
[64] "Mayor's Office." (2017). Town of East Haven Connecticut.
[65] "South Central Region, CT: Demographic & Socioeconomic Trends." (2017). South Central Regional Council of Governments.

on their border between East Haven and New Haven. Eighty-two percent of the residents commute to a different jurisdiction for work, with 2.1% using public transportation.[66]

LAND USE AND DEVELOPMENT

Once a small iron manufacturing community, East Haven is now a strong urban and suburban presence in Southern Connecticut. Serving mainly as a suburb of the City of New Haven, the Town has its own commercial and industrial district due to steady development in the region. East Haven is primarily concerned with "Recognizing itself as a shoreline community and designing development accordingly, as well as promoting diverse housing choices and protecting open space," according to the South Central Region: Plan of Conservation and Development 2018-2023 DRAFT.[67] In line with these concerns, the SCRCOG 2017 Coastal Resilience Plan outlines the creation of Town Beach Dunes, bank protection for coastal communities, road and bridge fortification, and non-coastal land protections.[68] Most homes along Cozy Beach Road have been elevated and so have the homes south of Silver Sands Road.

GUILFORD

The Town of Guilford is a coastal community along the Long Island Sound (though it stretches 12 miles northward), and consists of over 47 square miles. The region was first settled in 1639 as part of the New Haven area and by the 18th century, the region became its own "thriving coastal community."[69] Though originally thrived in shipbuilding, trade and granite mines, today Guilford is a popular summer destination for vacationers. Guilford contains the third largest collection of historical homes in New England, located in the Town Green.[70] The Town of Guilford is governed by a Board of Selectmen/Board of Finance/Town Meeting model.[71]

DEMOGRAPHICS

As of 2015, Guilford had a population of 22,392 with a population density of 450 per square miles, resulting in a mostly rural population. Approximately 58% of residents have a bachelor's degree or higher, making Guilford the 3rd most educated jurisdiction in the South Central Region. Guilford has 9500 houses (with over 91% occupied), and a median household income of $99,132, making it one of the wealthiest and sparsely populated Towns in the planning area. Unemployment, which was a high at 6.5% in 2010, has declined to 3.6% in 2016 the lowest in the region (tied with Woodbridge).[72]

[66] "South Central Region, CT: Demographic & Socioeconomic Trends." (2017). South Central Regional Council of Governments. Pg.24.
[67] "South Central Region: Plan of Conservation & Development 2018-2023 DRAFT Update." (2018). South Central Regional Council of Governments. P.71.
[68] "Southern CT: Regional Framework for Coastal Resilience." (2017). South Central Regional Council of Governments, MetroCOG, Nature Conservancy.
[69] "Welcome to the Town of Guilford, CT." (2017). The Town of Guilford.
[70] "Historical Overview." (2017). The Town of Guilford.
[71] "Government of Guilford." (2017). The Town of Guilford.
[72] "South Central Region, CT: Demographic & Socioeconomic Trends." (2017). South Central Regional Council of Governments.

GEOGRAPHY AND WATER

Guilford, which lies between the municipalities of Madison to the east, and Branford/North Branford to the west, is a long stretch of land that includes 15 miles of coastline consisting of tidal wetlands, natural harbors, small beaches, rocky shorefronts, and numerous islands. The northwest side is bordered by the Metacomet Ridge, including the Totoket Mountain. Guilford has approximately 6,000 areas of Open Space comprised of the East River Preserve, Westwoods, Timberland Preserve, Northwoods Preserve and several smaller parcels. The primary settlement, Guilford Center, is located in the southeastern corner of the jurisdiction. Guilford also contains the East River and West River, a number of small waterways and lakes, most notably Lake Quonnipaug.[73] The coastal town is included in the SCRCOG 2017 Coastal Resilience Plan.

TRANSPORTATION

Both Interstate 95 and U.S Route 1 run east to west, go through south Guilford. These roadways parallel the East ShoreLine railway, which goes through Guilford, and includes a stop in the town center. Close to 73% of the population commutes to a different jurisdiction for work (down from 82% in 2000), and less than 3% uses mass transportation even with the roadways in place.[74]

LAND USE AND DEVELOPMENT

Originally a coastal and agriculturally based economic community, Guilford has now become a popular summer tourist location with quaint coastal villages springing up in the 20th century. In the South Central Region: Plan of Conservation and Development 2018-2023 DRAFT, the vision statement for Guilford, states they are working to "promote a multi-modal transportation network, support higher density development, and encourage affordable housing."[75] The SCRCOG 2017 Coastal Resilience Plan outlines several improvements, such as upgrading and restoring Chittenden Beach, Grass Island and Long Cove, as well as improving shoreline infrastructure and transportation.[76] Guilford has also been a leader in farmland preservation with over 2700 acres (9% of its land) of protected farmland.[77]

HAMDEN

Hamden, often called the "Land of the Sleeping Giant" for its park of the same name, is located in the northwest corner of the planning region. Originally settled by the Puritans as part of New Haven, until it was incorporated in 1786. The jurisdiction has a long industrial history as the first site of 'mass production,' and the collection of villages has now become a significant suburb of New Haven.[78] The Town also supports many small businesses and light industry. The Town is home to the Eli Whitney Museum which memorializes the development of mass

[73] "Guilford Facilities, Parks & Beaches." (2017). The Town of Guilford.
[74] "South Central Region, CT: Demographic & Socioeconomic Trends." (2017). South Central Regional Council of Governments. Pg.24.
[75] "South Central CT Region Plan of Conservation & Development 2018 Update." (2017). South Central Regional Council of Governments.
[76] "Southern CT: Regional Framework for Coastal Resilience." (2017). South Central Regional Council of Governments, MetroCOG, Nature Conservancy.
[77] "South Central CT Region Plan of Conservation & Development 2018 Update." (2017). South Central Regional Council of Governments.
[78] Blake, William P. (1888). "History of the town of Hamden, Connecticut." Price, Lee & Co.

production, Lake Whitney and the Farmington Canal, which are all important historical and natural features of the town. Hamden is governed by a mayor-council form of government, with a 15-member legislative council.[79]

DEMOGRAPHICS

The Town of Hamden has 61,523 residents over a region of 33.3 square miles, with a population density of 1,800 people per square mile. Hamden contains 25,227 housing units, of which only 60.8% are owner occupied, leading to a renter population of 31%. Hamden contains Quinnipiac University on the border of North Haven, and 46.2% of the population has a Bachelor's Degree or higher. The median household income in Hamden is $70,791 with 8.3% of the population living below the poverty line. Unemployment is at 4.8 %, falling from a peak of 7.9% in 2010.[80]

GEOGRAPHY AND WATER

Hamden is lies between North Haven to the east, New Haven to the south, and Woodbridge/Bethany to the west. In the northeast, the Town features Mount Carmel, referred to as the 'Sleeping Giant,' which is a narrow ridge of the trap rock mountain range extending from Long Island Sound through the Connecticut River Valley.[81] This portion of the Town has remained rural due to the rugged and densely forested landscape. The Mill River, Lake Whitney, the Quinnipiac River make up the main water features of Hamden, as well as the Farmington Canal which has not been in use since 1984.[82] The main watersheds in Hamden are the Mill River Watershed, the Quinnipiac River Watershed, the Wintergreen Brook Watershed and the Willow Brook Watershed. The Mill River Watershed is the largest and its entire length is in the 100-year floodplain.[83]

TRANSPORTATION

Route 15 (Wilbur Cross Parkway) and U.S Route 5 traverse the jurisdiction of Hamden. There is no rail station in Hamden, though it does run through the area with the closest stop in New Haven. There are plans to build a train station on the Hamden/North Haven border. Public Transportation is provided by Connecticut Transit New Haven. Almost 78% of the population commutes to a different jurisdiction for work, though only 4.4% uses public transportation.[84]

LAND USE AND DEVELOPMENT

Much of Hamden's developed land is considered suburban residential with single-family homes on 10,000 feet to 40,000 feet lots. Homes are in relative proximity to the main commercial corridors and have access to public utilities.[85] In the South Central Region: Plan of Conservation and Development 2018-2023 DRAFT, Hamden lists is main concerns as, "the preservation of community character, fostering inclusive neighborhoods, and encouraging

[79] "Government." (2017). Hamden CT.
[80] "South Central Region, CT: Demographic & Socioeconomic Trends." (2017). South Central Regional Council of Governments.
[81] "Sleeping Giant Park Association." (2016).
[82] "About the Trail." (2017). Farmington Canal Rail to Trail Association.
[83] "Hamden Plan of Conservation and Development." (2004).
[84] "South Central Region, CT: Demographic & Socioeconomic Trends." (2017). South Central Regional Council of Governments. Pg.24.
[85] "Plan of Conservation and Development: South Central Region." (2009). South Central Regional Council of Governments.

infill development."[86] The Town is also concerned with flooding in areas around the rivers, reservoirs and canal bed. In the Sleeping Giant area, there is a concern for structural damages and interruption to transportation from fallen trees, as well as an increased risk of wildfire during drought periods.

MADISON

Madison, first settled in 1650, was known originally as East Guilford until it was incorporated in 1826. The Town is named for President James Madison.[87] This coastal town is the easternmost jurisdiction with in the South Central Region, and is bordered to the west by Guildford. Originally a center of coastal commerce and farming, the Town of Madison is now known as a "laid-back beach town" attracting summer tourism.[88] The Town contains Connecticut's largest shoreline park, Hammonasset State Park,[89] and commemorates its rich New England history in its many museums. A Board of Selectman governs Madison.[90]

DEMOGRAPHICS

According to 2015 census data, Madison has a population of 18,259 in a region of 36.8 square miles, leading to a density of 490 people per square miles that is concentrated along the southeast coast. Over 65% of Madison residents have obtained a bachelor's degree or higher, and the median household income is $107,183, making Madison the second in both education and income in the region. Of Madison's 7,968 housing units, only 85% are occupied due to summer tourism. Madison also has a relatively sizeable vulnerable population with 1.5% of the population living below the poverty line, several group homes and 3 senior housing areas.[91]

GEOGRAPHY AND WATER

The Town is 36 square miles and occupies a central location along the Long Island Sound shoreline. Madison also lays claim to the State's longest public beach (2.0 miles), Hammonasset Beach State Park, a popular tourist destination in summer months.[92] Madison Center, located near the southeast coast, is the main location for businesses and town services. The jurisdiction contains several small water features, most notably Lake Hammonasset, which lies on the eastern border. The northwest region of Madison contains the foothills of the Metacomet Ridge and includes the Rockland Preserve an "area of rocky hills, steep grey cliffs, and lovely wooded areas."[93]

[86] "South Central Region: Plan of Conservation & Development 2018-2023 DRAFT Update." (2018). South Central Regional Council of Governments. P.71.
[87] "Madison." (1975). Madison Connecticut.
[88] Giacobbe, Alyssa. (2017). "Dream Town: Madison, Connecticut." Coastal Living.
[89] "Hammonasset Beach State Park." (2017). Department of Energy and Environmental Protection.
[90] "Board of Selectmen." (2017). Madison Connecticut.
[91] "South Central Region, CT: Demographic & Socioeconomic Trends." (2017). South Central Regional Council of Governments.
[92] "Hammonasset Beach State Park." (2017). Department of Energy and Environmental Protection.
[93] "Rockland Preserve." (2017). Madison Connecticut.

TRANSPORTATION

Both Interstate 95 and U.S Route 1 run east to west, through south Madison. These roadways parallel the East ShoreLine railway, which goes through Madison, and includes a stop in the town center. Close to 71% of the population commutes to a different jurisdiction for work (down from 85% in 2000), and less than 3% uses mass transportation even with the roadways in place.[94]

LAND USE AND DEVELOPMENT

Once a Town based in coastal commerce, Madison has now become a popular summer tourist location with large parks and vibrant coastal communities. In the South Central Region: Plan of Conservation and Development 2018-2023 DRAFT, it states that Madison is working to "guide the conservation and development of Madison to maintain and enhance its character and quality of life, and help create a sustainable and resilient community."[95] Because of its coastline, Madison is covered under the SCRCOG 2017 Coastal Resilience Plan, which includes the restoration of Surf Club Town Beach, enhancing shoreline protections, replacing seawalls, and protecting transportation routes from water damage.[96]

MILFORD

Milford, is the 6th oldest town in Connecticut, purchased in 1639 from the Paugusset Tribe.[97] The Town's proximity to Long Island Sound made it primarily a shipbuilding, trade and small industry town that later developed a steady leather industry. Today Milford has a small-town feel, with a strong historical presence, and an economy that supports "manufacturing, retail, corporate office, and service industry."[98] The jurisdiction hosts the second longest "town green" in New England, containing multiple memorials. The borough of Woodmont and the village of Devon are encompassed in the jurisdiction. Milford's government is set up in the format of a Mayor and Board of Aldermen.[99]

DEMOGRAPHICS

Milford has 53,206 residents over 26.1 square miles (density of 2,341 per square mile), of which 39.4% hold a Bachelor's Degree or higher. Of Milford's 23,092 housing units, 71% are owner-occupied. The average resident of the City has a median household income of $80,247 with 6.6% of the population living below the poverty line (up from 3.9% in 2010). Unemployment has fallen from 9.2% in 2010, to 6.5% in 2016.[100]

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[94] "South Central Region, CT: Demographic & Socioeconomic Trends." (2017). South Central Regional Council of Governments. Pg.24.
[95] "South Central Region: Plan of Conservation & Development 2018-2023 DRAFT." (2018). South Central Regional Council of Governments. P.71.
[96] "Southern CT: Regional Framework for Coastal Resilience." (2017). South Central Regional Council of Governments.
[97] "Milford History." City of Milford Connecticut.
[98] "About the City of Milford." City of Milford Connecticut.
[99] "Mayor's Office." City of Milford Connecticut.
[100] "South Central Region, CT: Demographic & Socioeconomic Trends." (2017). South Central Regional Council of Governments.

GEOGRAPHY AND WATER

Milford lies in the southwest corner of the planning region, with 17 miles of Long Island Sound coastline. The Wepawaug River, ending in Milford Harbor, runs through the center of the town, which is located in the southeastern portion of the jurisdiction. Indian River also runs to the east of the Town, leading to Indian Lake in the north. The City of Milford contains several parks, notably Silver Sands State Park on the coast and Eisenhower Park along the Wepawaug River. Milford is bordered in the west by the Housatonic River, and to the east by West Haven.

TRANSPORTATION

Interstate 95, Interstate Route 15 (Wilbur Cross Parkway) and U.S Route 1 traverse Milford from west to east. The Metro North Railroad service has a stop in downtown Milford. Long Island residents can cross Long Island Sound to Milford Lisman Landing Marina by boat. Over 65% of Milford residents commute to another jurisdiction for work, with 4.8% using public transportation. The Iroquois Gas Corporation operates a natural gas transmission pipeline that runs along the Housatonic River from the northwest to the southwest. Tennessee Gas Pipeline Company operates a natural gas transmission pipeline that runs through the northern portions of the City.

LAND USE AND DEVELOPMENT

Milford hosts a vibrant retail and residential community, with a focus on coastal development and preserving historically significant sites. In the South Central Region: Plan of Conservation and Development 2018-2023 DRAFT, Milford's goals include, "preserving open space, promoting commercial corridors and infrastructure improvements including transportation networks, and encouraging Transit Oriented Development (TOD) and planning for climate change."[101] Because of Milford's extensive waterways, the area is susceptible to flood damage and storm surges. Under the Regional Framework for Coastal Resilience in Southern CT, Milford plans to complete several beach nourishment projects, repairing banks and breakwaters, installing green infrastructure, and protecting transportation routes.[102]

NEW HAVEN

New Haven, the main city in the South Central Region, was settled by English Puritans in 1638, who bought the land from the Quinnipiac Tribe. The area was viewed as a commercial empire that could control Long Island Sound, and that is what New Haven developed into. Yale was founded in the city in 1700, and was the co-capital of Connecticut until 1873.[103] Lying at the heart of the planning region, New Haven is bisected by New Haven Harbor, a major commercial port, and takes the title of most developed jurisdiction. In the 1850s, the City's manufacturing

[101] "South Central Region: Plan of Conservation & Development 2018-2023 DRAFT Update." (2018). South Central Regional Council of Governments. P.71.
[102] "Southern CT: Regional Framework for Coastal Resilience." (2017). South Central Regional Council of Governments, *MetroCOG, Nature Conservancy.*
[103] "New Haven's History." City of New Haven.

industry began to flourish, but today over half of the economy is made up of services and trade.[104] New Haven is governed with a mayor-council system, and has its own police department and fire department.[105]

DEMOGRAPHICS

New Haven has 130,612 residents, and is by far the most populated jurisdiction in the planning region (population density at 6,500 per square mile). The City is home to several colleges: Yale University, Gateway Community College, Southern CT State University, and Albertus Magnus College, though only 34.4% of residents have a Bachelor's Degree or higher. The City of New Haven has a median household income of $37,508, with 26.6% of the population living below the poverty level (highest in the region). Only 25.4% of New Haven's 56,673 housing units are owner occupied, due to over 70% being renter occupied. Unemployment is at 6.9% which is down from a peak of 12.2% in 2011.[106]

GEOGRAPHY AND WATER

The City of New Haven is in the center of the planning region, bordered to the south by Long Island Sound (Covered under the SCRCOG 2017 Coastal Resilience Plan). Making up a total of 20.1 square miles, the jurisdiction is home to a large deep harbor (Port of New Haven), two basalt trap rock ridges that border the northeast and northwest, and several water features. The City is bordered to the west by the West River, and the Mill River and Quinnipiac River in the east. There are extensive trail networks in West Rock Ridge State Park and East Rock Park which lie on the outskirts of the City.[107] Lake Whitney Open Space and West River Memorial Park are additional natural features that entice the residents of New Haven.

TRANSPORTATION

New Haven is the transportation center of the region, with Interstate 91, Interstate 95, U.S Route 1, and U.S Route 5 all passing through the City. Amtrak serves the City of New Haven, as well as Metro-North Railroad and Shore Line East, allowing New Haven residents to easily commute. The jurisdiction hosts the New Haven Division of Connecticut Transit as a bus system. In addition, New Haven is home to Tweed Airport and the Port of New Haven, two critical transportation facilities (See Critical Facilities). Only 57% of residents commute to a different jurisdiction for work, with 13.3 % using public transportation.[108]

LAND USE AND DEVELOPMENT

The City of New Haven is the most densely populated area of the planning region. The urban environment contains several neighborhoods centered on Downtown New Haven, which provides half the city's jobs and tax base. In the South Central Region: Plan of Conservation and Development 2018-2023 DRAFT, New Haven's development goals

[104] "New Haven's History." City of New Haven.
[105] "Government." City of New Haven.
[106] "South Central Region, CT: Demographic & Socioeconomic Trends." (2017). South Central Regional Council of Governments.
[107] "West Rock Ridge State Park." (2017). Department of Energy & Environmental Protection. 2002-2017, "East Rock Park." Connecticut: Still Revolutionary.
[108] "South Central Region, CT: Demographic & Socioeconomic Trends." (2017). South Central Regional Council of Governments. Pg.24.

include, "encouraging affordable and diverse housing, connecting community through a multi-modal transportation network, and adapting to climate change and sea level rise."[109] Alongside these goals, New Haven participated in the Regional Framework for Coastal Resilience in Southern CT, which outlines several projects such as, shoreline enhancement, river bank protection, updating seawalls and bulkheads, green infrastructure, and other mechanisms of flood protection.[i]

NORTH BRANFORD

North Branford, an early mill and farming community, was originally part of Branford and was purchased in 1638 for "twelve coats made in the English fashion."[110] North Branford was incorporated in 1831 and is located just to the east of the City of New Haven and west of Guilford, in the central portion of the South Central Region.[111] The Totoket Historical Society was founded in North Branford in 1958 and contains a wealth of historical artifacts, documents and photographs.[112] The Town has a low population density (<1000 per square miles), with a broad variety of business and industrial facilities, along with a strong agricultural focus. North Branford has a Town Manager-Council form of government.[113]

DEMOGRAPHICS

2015 data shows a population of 14,354 in North Branford, with nearly 38% of that population with a Bachelor's degree or higher (an increase of 10% in the last fifteen years). Over 95% of North Branford's 5,629 housing units are occupied, the Town has a median household income of $84,697 (up from $78,720 in 2010). The town has 3.6% of its population living below the poverty level, a major increase from 0.7% in 2010.The town has an unemployment rate that has declined from 8.0% in 2010 to 4.4% in 2016.[114]

GEOGRAPHY AND WATER

Totoket Mountain, part of the Metacomet Ridge, dominates much of North Branford (26.7 square miles). This mountain contains Lake Gaillard, a 1.5-mile-long reservoir formed in 1926, managed by the regional water authority. The lake watershed itself makes up approximately 1/3rd of the town land, and serves over 500,000 customers.[115] The southern end of North Branford is mostly suburban surrounded by farmland, with business and industrial uses along Route 80.[116] The town is unique in that it has retained much of its agricultural landscape despite its proximity to New Haven.

[109] "South Central Region: Plan of Conservation & Development 2018-2023 DRAFT." (2018). South Central Regional Council of Governments. P.71.
[110] Gregan, Janet S. "North Branford and Northford 1950-1981." (2001). Images of America. Arcadia Publishing.
[111] "About Us." (2016). Town of North Branford Connecticut.
[112] "Totoket Historical Society." (2017). Totoket Historical Society.
[113] "Government." (2016). Town of North Branford Connecticut.
[114] "South Central Region, CT: Demographic & Socioeconomic Trends." (2017).
[115] "About Us." (2016). South Central Connecticut Regional Water Authority.
[116] "Welcome to North Branford, CT." (2016). Town of North Branford Connecticut.

TRANSPORTATION

The main roads through North Branford are Routes 17, 22, 80, and 139. Due to its low population and proximity to New Haven, over 86% of North Branford's residents commute to another jurisdiction for work, with only 1.7% residents using public transportation as it is widely unavailable.[117] A section of the Algonquin Gas Transmission Company natural gas pipeline bisects the lower portion of Town from east to west.[118]

LAND USE AND DEVELOPMENT

North Branford, a Town with strong agricultural roots, has largely transformed into a residential Town, and a bedroom community for New Haven. However, Tilcon occupies a sizeable tract of land for trap rock production.[119] Lake Gaillard, a man-made reservoir built in the central portion of the Town, is the major water supply source for the South Central Connecticut Regional Water Authority (SCCRWA).[120] North Branford states, in the Municipal POCD Review table of the South Central Region: Plan of Conservation and Development 2018-2023 DRAFT, that they wish to "encourage development in line with market trends, protect natural resources and open space, and improve the transportation network."[121] Since the last mitigation plan, the Old Town Hall at 1599 Foxon Road has been removed and is currently as open space.

NORTH HAVEN

The Town of North Haven combines small town living, with access to higher education facilities, and the jobs and development of New Haven.[122] North Haven was originally an offshoot of New Haven to the north, and became its own incorporated town in 1786. The Town is 22 square miles, and is bisected by the Quinnipiac River, and is home to Quinnipiac University. Originally an agricultural community, with the advent of extensive transportation systems, the economy has become based in a growing commercial, manufacturing, and education base.[123] A Board of Selectman governs the Town of North Haven.[124]

DEMOGRAPHICS

Current data for the Town of North Haven shows a population of 23,937 with a median household income of $86,340 (up $5,000 since 2010). Eighty percent of North Haven's 9,015 houses are owner-occupied, and 3.9% of the Town's population lives below the poverty line (maintained since 2010). The unemployment rate in North Haven is 4.5% down from 8.0% since 2010, and 40% of the residents have a Bachelor's degree or higher.[125] North

[117] "South Central Region, CT: Demographic & Socioeconomic Trends." (2017). South Central Regional Council of Governments. Pg.24.
[118] "Utility by Town List." (2014). State of Connecticut.
[119] "Plan of Conservation and Development: South Central Region." (2009). South Central Regional Council of Governments.
[120] "Utility by Town List." (2014). State of Connecticut.
[121] "South Central Region: Plan of Conservation & Development 2018-2023 DRAFT Update." (2018). South Central Regional Council of Governments. P.71.
[122] "Visitors." (2014). Town of North Haven Connecticut.
[123] "Quality of Life." (2014). Town of North Haven Connecticut.
[124] "Government." (2014). Town of North Haven Connecticut.
[125] "South Central Region, CT: Demographic & Socioeconomic Trends." (2017). South Central Regional Council of Governments.

Haven is home to 40 businesses assessed at over $1 million, 5 industrial parks, 2 colleges and a variety of housing units.[126]

GEOGRAPHY AND WATER

The Town of North Haven is home to an excellent parks system, including the Quinnipiac River State Park and a portion of the Quinnipiac River Marsh Wildlife Area.[127] The Quinnipiac River runs north to south right through the middle of town and helps to create some of the natural divisions in North Haven. Portions of land along the river are broad and flat and stretch east into the neighboring Town of North Branford. The jurisdiction is also bordered by Hamden's Sleeping Giant State Park to the northwest.

TRANSPORTATION

Interstate Highway 91 and Route 15 (Wilbur Cross Parkway)bisect the Town of North Haven. The Algonquin Gas Transmission Company operates a natural gas transmission pipeline that bisects North Haven from north to south, veering off to the eastern corner of town.[128] Amtrak trains run through the town, though the closest stations are at Wallingford and New Haven. Tweeds airport is in nearby New Haven. In North Haven, 77.4% of the population commutes to a different jurisdiction for work, with only 2.2% using public transportation to get there.[129] The State of Connecticut is designing a train station located off Divine Street.

LAND USE AND DEVELOPMENT

Once a farming community, today very little agricultural land remains since the rapid residential and commercial land development that ensued after the interstate system was built.[130] There is a large industrial presence along Interstates 95 and 91. East of Interstate 91 is predominantly a suburban residential area. In the South Central Region: Plan of Conservation and Development 2018-2023 DRAFT, it states that North Haven's primary concerns are to "Enhance access to open space, promote affordable housing, work regionally to share resources, and promote sustainable development around transportation networks."[131] Urban flooding is also a major concern with areas within the river valley at the largest risk. Some commercial properties regularly (up to two times per year) experience one to two inches of floodwater. The Town is also at risk for damage from downed trees and inadequate storm water management.

Since the previous mitigation plan, North Haven has built several new subdivisions and apartment buildings including:

- Lexington Gardens – 76 units
- Pier Pond Hill – 115 units, not completed

[126] "Community." (2014). Town of North Haven Connecticut.
[127] "Community." (2014). Town of North Haven Connecticut.
[128] "Utility by Town List." (2014). State of Connecticut.
[129] "South Central Region, CT: Demographic & Socioeconomic Trends." (2017). South Central Regional Council of Governments. Pg.24.
[130] "Community." (2014). Town of North Haven Connecticut.
[131] "South Central Region: Plan of Conservation & Development 2018-2023 DRAFT Update." (2018). South Central Regional Council of Governments. P.71.

- Mikey's Way – 6 new buildings
- Summer Lane Condos – 18 detached units
- Patten Road – Winding Brook
- Windsor Road East – 6 lots
- Washington Avenue – 3 apartment buildings with 150 units
- State Street – 150 units

In addition, Quinnipiac University created a sub-campus on Bassett Road. Amazon is expected to renovate 125 acres building site formally used by Pratt Whitney with a 857,000-square foot multi-level building.

ORANGE

The Town of Orange, once occupied by the Paugusset Indians, was purchased in 1639 and incorporated in 1822. In 1921, the municipalities of Orange and West Haven separated, with Orange lying on the eastern border of the planning region.[132] The Town was previously an agricultural community, until the mid-1900s when it became a populated suburb of New Haven, though it only has a population density of 800 per square mile. Orange prides itself in rich history and traditions including the Orange Center Historic District and the Orange County Fair. A Board of Selectman governs the Town of Orange.[133]

DEMOGRAPHICS

Orange hosts its 13,946 residents over a region of 17.4 square miles. The Town of Orange supports 5,031 housing units, 84.3% of which are owner-occupied. The average resident of Orange has a median household income of $107,047 with 3.8% of the population living below the poverty line (up from 2.5% in 2010). Unemployment has fallen from 6.6% in 2010, to 4.0% in 2016. Sixty percent of the population has a Bachelor's Degree or higher, making Orange the third most education jurisdiction in the planning region.[134]

GEOGRAPHY AND WATER

Orange remains an open and well-planned residential community, whose residents prioritize stewardship for the environment and protection of natural resources. The Town's 17 square miles of tree-lined rolling hills lie beside the Housatonic River, which acts as the western border of the Town. Wooster Island, located in the Housatonic River, is a popular fishing location. The jurisdiction has several small parks and waterways including Turkey Hill Preserve and the Wepawaug Conservation Area that break up the residential area.

TRANSPORTATION

Orange is traversed by Interstate 95, Route 15 (Wilbur Cross Parkway), and U.S Route 1. Metro-North Railroad service also runs through the southeast of the jurisdiction with the nearest stop in West Haven. The Iroquois Gas Corporation operates a natural gas transmission pipeline that runs along the Housatonic River. In 2012, municipal

[132] "Town beginnings…" (2017). Orange Historical Society, Orange, CT.
[133] "First Selectmen's Office." (2017). Town of Orange Connecticut.
[134] "South Central Region, CT: Demographic & Socioeconomic Trends." (2017). South Central Regional Council of Governments.

meeting revealed that Hurricane Sandy felled 40 trees and more common periodic heavy rains caused flooding on U.S. Route 1. Over 82% of the population commutes to another jurisdiction for work, and only 3.3% uses public transportation.[135]

LAND USE AND DEVELOPMENT

Though Orange used to be a farming community, it has since developed into a popular residential area on the western outskirts of the New Haven community. The town has several structures listed on the National Register of Historic Places, such as the Henry F. Miller House.[136] In the South Central Region: Plan of Conservation and Development 2018-2023 DRAFT, Orange's goals were focused on, "protecting community character, promoting conservation through design, and encouraging well-planned development."[137] The area is periodically subjected to damage from downed trees, river flooding, ice storms and hurricanes.

WALLINGFORD

Wallingford, which lies in north part of the planning area and covers almost 40 square miles, was founded as a small settlement in 1670. Wallingford lies astride the Quinnipiac River, sitting between the cities of Meriden and New Haven, and was the site of the last witchcraft trial in New England in 1697.[138] Previously a town based in silver and Britannia manufacturing, Wallingford has now diversified to attract high-tech metal manufacturing, health care, and research development corporations.[139] The present Town Charter created a Mayor-Council form of government in 1962.[140]

DEMOGRAPHICS

The Town of Wallingford has a population of 45,089 (a population density 1,100 people per square miles) with 19,280 occupied housing units. The average household income in Wallingford is $74,060 with 4.7% of the residents living below the poverty level (down from 6.8% in 2010). Over 36% of the population has a Bachelor's Degree or higher, an increase of 7.4% since 2000. Unemployment was 4.5% in 2016, down from a high of 8.3% in 2010.[141]

GEOGRAPHY AND WATER

Wallingford follows the Quinnipiac River which runs longitudinally through the jurisdiction. The Town sits 5 miles from Meriden and 13 miles from New Haven. Community Lake Park occupies a small central area in Wallingford, along with several other small parks and country clubs. The town center lies along the Quinnipiac River and Highway 5, considered the Harford-New Haven-Springfield corridor. The jurisdiction lies in the Connecticut Valley

[135] "South Central Region, CT: Demographic & Socioeconomic Trends." (2017). South Central Regional Council of Governments. Pg.24.
[136] "Properties" Orange Historical Society, Orange, CT.
[137] "South Central Region: Plan of Conservation & Development 2018-2023 DRAFT Update." (2018). South Central Regional Council of Governments. P.71.
[138] "History and Description." (2017). Wallingford Connecticut.
[139] "History and Description." (2017). Wallingford Connecticut.
[140] "Government." (2017). Wallinford Connecticut.
[141] "South Central Region, CT: Demographic & Socioeconomic Trends." (2017). South Central Regional Council of Governments.

Lowlands, with little change in elevation. Wallingford has experienced damage from river flooding caused by hurricanes, tropical storms and heavy rains. Ice and snowstorms have contributed to damages as well.

TRANSPORTATION

The Town of Wallingford is traversed by U.S Route 5 and Interstate 91 (running north to south), as well as Route 15 (Wilbur Cross Parkway). The Meriden airport, which lies on the border of Wallingford and Meriden, is actively used for private aircrafts. There is currently an Amtrak rail station in the town. The Algonquin Gas Transmission Company operates a natural gas transmission pipeline that transverses the southwest corner of town.[142] Approximately 65% of the population commutes to a different jurisdiction for work, with only 1% using public transportation.[143]

LAND USE AND DEVELOPMENT

Wallingford is developing into a town economically based in hi-tech corporations, including health-care companies. The Town has a focus on maintaining transportation routes, as reflected in the South Central Region: Plan of Conservation and Development 2018-2023 DRAFT, where Wallingford wishes to "Promote town center development, transportation connections and protect community character."[144] Less than half of the population resides in the town center, so developing a more central community is important. The Town is home to several historically significant buildings, including the oldest brick home in the State, the John Barker House, and the Samuel Simpson House, built by notable architect Henry Austin.[145]

WEST HAVEN

West Haven was originally part of the New Haven Colony, where it joined with North Milford to become Orange in 1822. It was only in 1921 that West Haven split from Orange to become its own town, taking the title of "Connecticut's Youngest City," though it is one of the oldest settlements.[146] Previously a shipping and industrial center for rubber, West Haven has now become a blue-collar, middle-class suburb of New Haven. The Town was home to the Savin Rock Amusement Park running along the harbor, until the 1960s.[147] The jurisdiction also contains the University of New Haven and a portion of West River Memorial Park. West Haven has a mayor-council form of government, with three independent fire districts.[148]

DEMOGRAPHICS

The Town of West Haven is made up of 55,189 residents with a population density of 5,170 per square mile. Over 49% of West Haven's 22,290 housing units are owner occupied, and the median household income of $50,846 with

[142] "Utility by Town List." (2014). State of Connecticut.
[143] "South Central Region, CT: Demographic & Socioeconomic Trends." (2017). South Central Regional Council of Governments. Pg.24.
[144] "South Central Region: Plan of Conservation & Development 2018-2023 DRAFT Update." (2018). South Central Regional Council of Governments. P.71.
[145] "Points of Interest." (2017). Wallingford Connecticut.
[146] "Our Town." (2005). West Haven Historical Society.
[147] "Savin Rock Festival." West Haven Connecticut.
[148] "City Hall." *West Haven Connecticut.*

14.4% of the population living below the poverty line (up from 10.1% in 2010). Only 23% of the population has a Bachelor's Degree or higher (an increase of 3.9% since 2000). Unemployment is at 6.2% falling from 10.8% in 2011, when it peaked.[149]

GEOGRAPHY AND WATER

West Haven is situated in the middle of the planning region directly to the west of New Haven, with its southern border lying on Long Island Sound. Though it is only 11.0 square miles, the Town has 3.5 miles of publicly accessible beaches (1/4 of the total public beaches in Connecticut). West Haven is bound in the southwest by the Oyster River, and in the north by West River. Other water features in the jurisdiction include Lake Phipps, Cove River, the Maltby Lakes and the Maltby Lakes Dams. West Haven is particularly vulnerable to flood damage because of its rivers and coastal proximity, and falls under the SCRCOG 2017 Coastal Resilience Plan.

TRANSPORTATION

Several transportation routes, including Interstate 95, U.S. Route 1, run through the Town of West Haven. The Metro-North Railroad service has a stop in the town.. Seventy-seven percent of the residents commute to a different jurisdiction for work, with 5.9% using public transportation.[150]

LAND USE AND DEVELOPMENT

West Haven is a densely populated, working-class suburb of New Haven. Alongside its residential community, the Town is home to long stretches of shoreline, including the Sandy Point Estuary, and several buildings on the National Register of Historic Places.[151] In the South Central Region: Plan of Conservation and Development 2018-2023 DRAFT, West Haven outlines their concerns as, "Shaping the city into a more vibrant, connected and livable community for residents of all ages, as well as fostering an environment that is attractive to businesses and residents alike."[152] As the Town of West Haven continues to develop, it participated in the Regional Framework for Coastal Resilience in Southern CT that encourages beach nourishment, replacing flood protection structures, green infrastructure, protecting roadways and property, and preventing inland river flooding.[153] The University of New Haven works closely with the Town to tackle stormwater issues and flooding issues near the university.

WOODBRIDGE

The Town of Woodbridge became an independent parish in 1739, having previously been a part of Hamden and New Haven. Woodbridge began as an agricultural community located in the West River Valley "Flats," and has now expanded into a wealthy suburb of New Haven.[154] The Town has "5 residential districts, 2 commercial/ industrial

[149] "South Central Region, CT: Demographic & Socioeconomic Trends." (2017). South Central Regional Council of Governments.
[150] "South Central Region, CT: Demographic & Socioeconomic Trends." (2017). South Central Regional Council of Governments. Pg.24.
[151] "Visitors." West Haven Connecticut.
[152] "South Central Region: Plan of Conservation & Development 2018-2023 DRAFT Update." (2018). South Central Regional Council of Governments. P.71.
[153] "Southern CT: Regional Framework for Coastal Resilience." (2017). South Central Regional Council of Governments, MetroCOG, Nature Conservancy.
[154] "Welcome to Woodbridge." Woodbridge Connecticut.

districts, 2 professional office districts and a park district."[155] The several historical features, such as the Darling House Museum, are maintained by the Amity & Woodbridge Historical Association. A Board of Selectman and Board of Finance govern Woodbridge.[156]

DEMOGRAPHICS

Only 8,939 people live in the Town of Woodbridge, covering 19.2 square miles with a density of 470 people per square mile. Woodbridge is the wealthiest jurisdiction in the planning region, with a median household income of $133,412, and 3.3% of the population living below the poverty level. The Town has the lowest unemployment at 3.6% (down from 5.7% in 2010), and the highest percentage of residents with a Bachelor's Degree or higher at 68.5%. Of 3,224 housing units, 85% are owner occupied.[157]

GEOGRAPHY AND WATER

Woodbridge lies on the western edge of the planning region, border to the east by Hamden and New Haven, Bethany to the north, and Orange to the South. The western portion of Woodbridge is typically hilly while the eastern end has come to be known as "The Flats" for its level terrain.[158] The Town has many small waterways and features, including an extensive wetland system and Lake Dawson. Woodbridge is border on the east by West Rock Ridge State park, and in the west by Naugatuck State Forest Quilinan Resevoir, and contains a popular network of walking and biking trails.[159]

TRANSPORTATION

Route 15 (Wilbur Cross Parkway) runs through the southeastern region of Woodbridge. No rail lines connect the Town, though The Tennessee Gas Pipeline Company operates a natural gas transmission pipeline that runs along the eastern border of Woodbridge.[160] Over 83% of the population commutes to a different jurisdiction for work (up from 50% in 2000); 2.6% of residents us public transportation to get to work.[161]

LAND USE AND DEVELOPMENT

The Town of Woodbridge supports a thriving business community and offers plenty of outdoor recreation at numerous parks and trails. According to the website, "Woodbridge is a rural-like town of rolling green countryside dotted with one-family homes on mostly large lots of 1.5 acres of more."[162] In the South Central Region: Plan of Conservation and Development 2018-2023 DRAFT, it states Woodbridge's primary concerns as, "development in town nodes, inclusion of affordable housing, promoting corridor improvement, and building on previous successful

[155] "Town of Woodbridge, Plan of Conservation and Development." (2005).
[156] "New Resident Guide." Woodbridge Connecticut.
[157] "South Central Region, CT: Demographic & Socioeconomic Trends." (2017). South Central Regional Council of Governments.
[158] Donato, Simon. "History of the 'Flats' in the West River Valley." (2013).
[159] "Naugatuck State Forest – Quillinan Reservoir." RootsRated.
[160] "Utility by Town List." (2014). Connecticut.
[161] "South Central Region, CT: Demographic & Socioeconomic Trends." (2017). South Central Regional Council of Governments. Pg.24.
[162] "Welcome to Woodbridge." Woodbridge Connecticut.

development patterns."[163] The Town has previously experienced damage from flood, wildfire and downed trees, especially in the expansive parkland areas along the eastern border. Since the last mitigation plan, a new 157-unit apartment building called Woodbridge Village is in the design phase and expected to be located on Bradley Road/Litchfield Road.

[163] "South Central Region: Plan of Conservation & Development 2018-2023 DRAFT Update." (2018). South Central Regional Council of Governments. P.71.

CHAPTER 3. PLANNING PROCESS

The planning process was developed in full compliance with the current planning requirements of the Federal Emergency Management Agency (FEMA) per the following rules and regulations:

- Robert T. Stafford Disaster Relief and Emergency Assistance Act (Public Law 93-288), as amended by the Disaster Mitigation Act of 2000
- Code of Federal Regulations – Title 44, Chapter 1, Part 201 (§201.6: Local Mitigation Plans)
- FEMA's Local Mitigation Plan Review Guide (dated October 1, 2011)
- Demonstrating Good Practices Within Local Hazard Mitigation Plans (FEMA Region 1, April 2017)

A1. Does the Plan document the planning process, including how it was prepared and who was involved in the process for each jurisdiction? (Requirement §201.6(c)(1))

In addition, the plan was prepared in a manner that maximizes credit points under the National Flood Insurance Program's Community Rating System (CRS) for participating jurisdictions. The JCC Team utilized FEMA's 2017 version of the *CRS Coordinator's Manual* and its own internal planning crosswalk to ensure that the plan is consistent with CRS requirements for floodplain management planning (Activity 510). In the previous plan, only the Town of Hamden had participated in the CRS. Now that the City of Milford, City of New Haven and the Town of East Haven have been added, this plan represents four communities that have participated in the CRS. At the moment, Milford and New Haven have current status, the Town of Guilford is applying and the Towns of Hamden and East haven have a rescinded status. The Planning Process used to develop this plan, maximizes possible credits toward joining and participating in the CRS program. Details about the CRS are given in Chapter 5 Capability Assessment.

The theme throughout the planning process was: **Jurisdictions are individual entities with specific characteristics/risks that need to be addressed.**

This Multi-Jurisdiction Hazard Mitigation Plan eases the burden of keeping these communities safe by identifying and communicating hazard risks, developing actions to reduce or eliminate those risks, and making each jurisdiction eligible for FEMA mitigation program funding. In addition, the mitigation planning process educated key stakeholders within each jurisdiction and strengthened partnerships between these stakeholders and SCRCOG staff.

The previous Multi-Jurisdiction Hazard Mitigation Plan included ten Jurisdictions out of the fifteen in the SCRCOG Region. For this plan, four of the five missing Jurisdictions were added. The City of Meriden may join the regional planning process for the next update. The four Jurisdictions who joined the planning process had previous mitigation plans:

1. Town of East Haven Hazard Mitigation Plan Update 2012
2. Town of Guilford Natural Hazard Mitigation Plan 2012
3. City of Milford Hazard Mitigation Plan Update 2013
4. City of New Haven Natural Hazard Mitigation Plan Update II 2017

PLANNING TEAM

The SCRCOG Mitigation Planning Team consisted of three SCRCOG staff members and a consulting team. Carl Amento, Executive Director, Eugene Livshits, Senior Regional Planner and Rebecca Andreucci, Regional Planner were the SCRCOG representatives. Jamie Caplan and Jamie Caplan Consulting LLC (JCC) led the consulting team. JCC partnered with Milone & MacBroom and Punchard Consulting LLC to complete the project. In 2014, the Planning Team was nearly identical. At that time, Darrin Punchard worked for AECOM. For the 2018 update, Milone & MacBroom were added to the team for their expertise in South Central Connecticut. They also authored the original plans for the four Jurisdictions who joined this Multi-Jurisdiction effort in 2018.

The Planning Team met on May 2, 2017 for a Kick-off Meeting. At this meeting, all the project tasks were reviewed as well as, the project timeline and immediate next steps. The agenda and sign-in sheet from this meeting are in Appendix A.

Following the Kick-off Meeting, the Planning Team developed a Work Plan and a Project Fact Sheet. Each are in Appendix A. The Project Fact Sheet was distributed to the Advisory Committee in their project binders and posted to the project website (http://scrcog.org/regional-planning/regional-hazard-mitigation/) for reference. A copy of the Project Timeline is shown below in **Figure 3-6.**

SCRCOG

SOUTH CENTRAL REGIONAL COUNCIL OF GOVERNMENTS

Planning for Our Region's Future

Bethany Branford East Haven Guilford Hamden Madison Meriden Milford
New Haven North Branford North Haven Orange Wallingford West Haven Woodbridge

Carl J. Amento, Executive Director

Tasks and Deliverables	2017								2018					
	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun
Task 1. Planning Process														
Advisory Committee Meetings		✓		✓		✓			✓					
Municipality Meetings			✓	✓										
Public Workshops						✓			✓					
Task 2. Risk Assessment														
Draft Risk Assessment						✓								
Task 3. Capability Assessment														
Draft Capability Assessment						✓								
Task 4. Hazard Mitigation Strategy														
Draft Mitigation Strategy								✓						
Task 5. Plan Maintenance Process														
Draft Plan Maintenance Process									✓					
Task 6. Adoption and Approval														
Municipal and Public Review and Revisions										✓				
Final Draft of HMP Update for CT DESPP Review and Revision											✓	✓		
Final Draft of HMP Update for FEMA Review and Approval													✓	✓

Figure 3-6 Project Timeline

OUTREACH STRATEGY

The JCC Team coordinated with the SCRCOG staff in the development of a Work Plan and Stakeholder Engagement Strategy that successfully generated public interest, solicited citizen input, and engaged additional partners in the planning process. Communication among the key project stakeholders was an essential component of reaching project success. The Work Plan and schedule reflect the Planning Team's desire to complete the planning process prior to the expiration of The City of Milford's 2013 Hazard Mitigation Plan in August 2018.

The Work Plan detailed the sub-tasks under the six main planning tasks:

1. Planning Process
2. Risk Assessment
3. Capability Assessment
4. Hazard Mitigation Strategy
5. Plan Maintenance Process
6. Adoption and Approval

Developing a schedule for the Advisory Committee, formed during the previous planning process was one of the first critical tasks for the Planning Team. The Advisory Committee met several times between 2014 and 2018 to discuss implementation of mitigation actions. For the 2014 planning process the committee met eight times, for this planning process the committee met four times. This change was made to shift focus to the individual Jurisdictions participating. Details regarding each Advisory Committee meeting are included below as well as in Appendix A.

The Stakeholder Engagement strategy is detailed in **Table 3-4** below. Some of the meetings were held slightly later in the planning process. The Stakeholder Engagement strategy coincides with the entire planning process so public input was sought in all phases of the planning process. The Planning Team included the public and stakeholders in all key areas including gathering data for the risk assessment, updating jurisdiction capabilities for the capability assessment and development of hazard mitigation actions for the mitigation strategy. The Advisory Committee intends to continue involving the public and stakeholders throughout the implementation of this Plan.

Table 3-4 Stakeholder Engagement Strategy Calendar

Stakeholder Engagement and Public Outreach through the Planning Process	2017								2018					
	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun
Advisory Committee Meetings		✓			✓		✓		✓					
Jurisdiction Meetings			✓	✓	✓									
Regional Public Workshops						✓			✓					
Jurisdiction Public Workshops						✓	✓							

Stakeholder Engagement and Public Outreach through the Planning Process	2017								2018					
	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun
Hazard Mitigation Plan Survey					✓	✓	✓	✓	✓	✓				
Project Website	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Review and Comment on Draft Plan													✓	✓

ADVISORY COMMITTEE

The Advisory Committee includes a minimum of one representative from each of the fourteen Jurisdictions participating in the planning process. Meriden is the only jurisdiction in the SCRCOG region not to formally participate in the planning process. They were invited to all Advisory Committee meetings and to the public meeting. They expressed an interest in participating in the future. Table 3-5 below shows the names and associated jurisdictions for each of the Advisory Committee members. The Greater New Haven Water Pollution Control Authority (GNHWPCA) became quite involved in the planning process and Isabella Schroeder attended many Advisory Committee meetings.

The Advisory Committee met at the SCRCOG offices four times throughout the project to provide input to the Planning Team throughout all phases of the project and to provide feedback on all project deliverables. Each of these meetings is outlined in detail in the following pages. In addition, the committee participated in the *South Central Connecticut Hazard Mitigation Plan Survey*, assisted with data collection, identified stakeholders in each participating jurisdiction, organized Jurisdiction meetings, held a public workshop in their jurisdiction, assisted with a regional workshop, submitted mitigation action implementation worksheets and reviewed the mitigation plan.

Table 3-5 Advisory Committee Members

Jurisdiction Organization	First name	Last name	Phone	Email	Position
Bethany	Clark	Hurlbert	203-444-4469	clarkhurlburt@sbcglobal.net	Second Selectman/Deputy Emergency Management Director
Branford	Janice	Plaziak	203-315-0606	jplaziak@branford-ct.gov	Town Engineer
East Haven	Matthew	Marcarelli	203-468-3221	mmarcarelli@easthavenfire.com	Fire Chief, Director of Emergency Management
	Kevin	White	203-468-3250	eh.kwhite@gmail.com	Town Engineer
Guilford	Kevin	Magee	203-453-8074	mageek@ci.guilford.ct.us	Environmental Planner
	James	Portly	203-453-8037	portleyj@ci.guilford.ct.us	Town Engineer
	Dennis	Johnson	203-453-8036	johnsond@ci.guilford.ct.us	Health Director
Hamden	Mark	Austin	203-287-7040	maustin@hamden.com	Town Engineer
	Craig	Cesar	203-287-2600	ccesare@hamden.com	Director of Public Works
	Dan	Kops	203-287-7070	dkops@hamden.com	Town Planner
	Matt	Davis	203-287-7070	mdavis@hamden.com	Assistant Town Planner
Madison	Sam	DeBurra	203-245-5617	deburras@madisonct.org	Director of Emergency Management
	John	Iennaco	203-245-5660	iennacoj@madisonct.org	Director of Public Works/Town Engineer
	David	Anderson	203-245-5633	andersond@madisonct.org	Director of Planning & Economic Development
Milford	William	Richards	203-874-6321	wrichards@ci.milford.ct.us	Deputy Director of Emergency Management
	Joseph	Griffith	203-783-3374	jgriffith@ci.milford.ct.us	Director of Permitting and Land Use
	MaryRose	Palumbo	203-783-3256	mpalumbo@ci.milford.ct.us	Inland Wetland Agent
	Steven	Johnson	203-878-7812	stevenjohnson@ci.milford.ct.us	Open Space & Natural Resource Agent
	John	Hangen	203-783-3232	jhangen@ci.milford.ct.us	GIS Coordinator
	Megan	McGaffin			GIS Coordinator

Jurisdiction Organization	First name	Last name	Phone	Email	Position
New Haven	Michael	Piscitelli	203 946-2867	mpiscite@newhavenct.gov	Deputy Economic Development Administrator
North Branford	Kurt	Weiss	203 484-6009	townengineer@townofnorthbranfordct.com	Town Engineer
North Haven	Jonathan	Bodwell	203-239-5321	bodwell.jonathan@town.north-haven.ct.us	Town Engineer
Orange	Fred	Palmer	203-444-2733	Fredpalmer63@gmail.com	Director of Emergency Management
	Tina	Russo	203-444-2733	trusso@orange-ct.gov	
Wallingford	Richard	Heidgerd	203-294-2730	rheidgerd@wallingfordfd.com	Fire Chief - Emergency Management Director
West Haven	Abdul	Quadir	203-937-3577	quadir@westhaven-ct.gov	City Engineer
	David	Killeen	203-937-3580	DKilleen@westhaven-ct.gov	Assistant City Planner
Woodbridge	Warren	Connors	203-389-3421	wconnors@woodbridgect.org	Public Works Director
	Betsy	Yagla	203-389-3403	byagla@woodbridgect.org	Assistant Administrative Officer
GNHWPCA	Isabella	Schroeder	203-466-5280	ischroeder@gnhwpca.com	Senior Engineer
SCRCOG	Carl	Amento	203-466-8625	camento@scrcog.org	Executive Director
	Rebecca	Andreucci	203-466-8601	randreucci@scrcog.org	Regional Planner
	Eugene	Livshits	203-466-8626	elivshits@scrcog.org	Senior Regional Planner
Jamie Caplan Consulting	Jamie	Caplan	413-586-0867	Jame@jamiecaplan.com	Principal
	Emily	Raphael			Student Intern, Smith College
Milone & MacBroom	David	Murphy	203-271-1773	dmurphy@mminc.com	Manager of Water Resources Planning
	Noah	Slovin	603-218-2320	nslovin@mminc.com	Environmental Scientist and Planner
Punchard Consulting	Darrin	Punchard	617-777-2001	darrin@punchardconsulting.com	Principal

ADVISORY COMMITTEE MEETINGS

The Agenda, Sign-in Sheet, and PowerPoint presentation for each of the Advisory Committee meetings is included in Appendix A.

JUNE 21, 2017

The first Advisory Committee meeting provided an opportunity to welcome the four new jurisdictions to the planning process and review the Work Plan in detail. The Planning Team distributed project binders that included the Project Fact Sheet, Work Plan and Schedule. Seventeen people attended the meeting at the SCRCOG offices in North Haven, this included representatives from eleven of fourteen jurisdictions participating in the planning process.

Figure 3-7 Advisory Committee Meeting, June 21, 2017

Beyond detailing the planning process, time was spent reviewing expectations of the Advisory Committee. Unlike, the last planning process, the Advisory Committee was tasked with hosting a Jurisdiction Meeting and a Public Meeting. A list of possible local and regional stakeholders to include in a jurisdiction meeting was distributed. This list was based on the Mitigation Planning Team Worksheet 2.1 from FEMA's Local Mitigation Planning Handbook. Absent from this list is the Tree Commission, however, the planning process has taught us to add the Tree Commission to the list in the future.

During an introduction to the Risk Assessment a data collection sheet was distributed requesting that the Advisory Committee collect information for the Planning Team regarding past grant award status, cost of response to past storms, Public Assistance awards and critical facility information. The data collection worksheet is included in Appendix B.

Discussion during this meeting, included incorporating the four additional jurisdictions and developing regional as well as jurisdiction specific hazard mitigation actions. The Advisory Committee members expressed an interest in maximizing National Flood Insurance Program Community Rating System credits. The development of a regional survey was also discussed, including the type and number of questions. It was determined that the Planning Team would develop a survey for review by the Advisory Committee.

SEPTEMBER 14, 2017

Seventeen people attended the September 14, 2017 Advisory Committee meeting. They represented eight of the 14 participating jurisdictions. The agenda included a brief update on the planning process including the thirteen jurisdiction meetings held to date and the outreach plan for the survey. The Planning Team distributed the Safe Growth Survey at this meeting and requested that each jurisdiction complete the survey for inclusion in the Capability Assessment. Results were compared to previously completed surveys in 2014. A brief update on the risk assessment included a high-level summary of ongoing tasks. A question was posed by Milford regarding the use of

losses from past storms, specifically data listings on substantially damaged properties and how these structures have been improved. The risk analysis will include these data sets if Milford can provide them. The Planning Team requested that Milford provide a narrative on their experience using assessor grade characteristics to predict damages.

The Planning Team facilitated an initial conversation about the 2014 mitigation vision and goal statements and introduced the Mitigation Action Tracker, the excel database developed to track the current and ongoing status of all mitigation actions related to the plan. The discussion around the goal statements led to a discussion about regional goals in addition to jurisdiction specific goals. It was determined that the Advisory Committee would like to have some regional goals and actions that may promote sharing equipment for use post disaster, for instance snow removal equipment. There was also a conversation about preparing to respond, in other words, mitigating response. The Regional Emergency Planning Committee and Regional Hazardous Materials Teams were mentioned. The Advisory Committee is interested in "being prepared to respond" and feels that is part of the definition of mitigation.

In addition, the committee discussed how the Regional Framework for Coastal Resilience published in June 2017 and the coastal resilience plans for Branford, Guilford, Madison, Milford and West Haven would be incorporated into the Mitigation Action Tracker. Integrating these planning efforts was a priority for the Advisory Committee.

NOVEMBER 16, 2017

Seventeen people attended the third Advisory Committee meeting on November 16, 2017. The Planning Team reminded the Advisory Committee to schedule a Public Meeting in their jurisdiction prior to the new year, if they had not already had one. The Planning Team provided sign-in sheets, a PowerPoint presentation template, a flyer template and a press release template for customization by each jurisdiction. At this point in the planning process, only thirty-nine people had responded to the online survey. The Advisory Committee discussed increasing participation by expanding outreach efforts in conjunction with outreach for the public meetings.

Figure 3-8 Advisory Committee Meeting, November 16, 2017

Risk Assessment results were presented at this meeting with an emphasis on what is different in the results from the previous plan. At this meeting, the group began a more thorough discussion of regional issues raised by the risk assessment and how to include them in the plan. The jurisdictions share issues of flooding, trees and power outages and sea level rise among others. In addition, critical facilities or assets that the region shares were

discussed, such as Tweed New Haven Airport. The group agreed that the problems should be managed collaboratively and potential solutions will be included in the Mitigation Strategy portion of the plan.

The majority of the meeting focused on updating the Mitigation Action Tracker with new actions in five action categories:

1. Local Plans and Regulations
2. Structure and Infrastructure Projects
3. Natural Systems Protection
4. Education and Awareness Programs
5. Emergency Preparedness

The Planning Team presented each of these categories with examples of projects within each. Some of the examples were completed projects, for instance the Merritt Avenue Bridge Replacement in Woodbridge as shown in Figure X. Others were suggested actions such as those shown in Figure Z. It was suggested that the Advisory Committee members review the actions in other jurisdictions by clicking on their tab in the Mitigation Action Tracker. They were also encouraged to review FEMA's Mitigation Ideas: A Resource for Reducing Risk to Natural Hazards. This resource is posted on the project website at http://scrcog.org/regional-planning/regional-hazard-mitigation/. Finally, a Mitigation Action Worksheet was distributed for anyone who prefers to use a Word document instead of the Excel spreadsheet.

Figure 3-9 Town of Woodbridge Mitigation Project Example

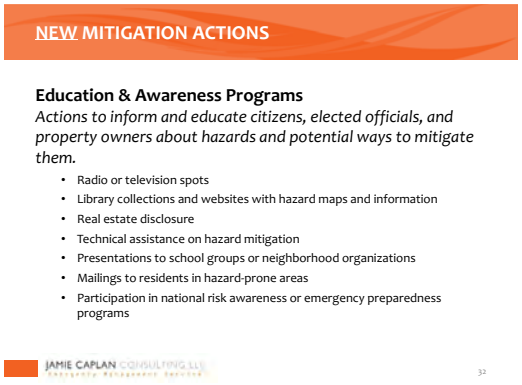


Figure 3-10 Potential List of Mitigation Actions

FEBRUARY 8, 2018

Representatives from thirteen of the fourteen jurisdictions were in attendance at the fourth Advisory Committee Meeting on February 8, 2018. The Planning Team reported a huge jump in Public Survey participation thanks to the public outreach efforts of each jurisdiction. Each of the jurisdictions held a public meeting except for East Haven so the regional public meeting was scheduled there for February 22, 2018. The Goal Statements for the plan were reviewed for the final time and the goal related to trees was amended. It was brought to the team's attention by the Hamden Tree Commission that healthy native trees can reduce the impact of natural hazards and future climate conditions. For this reason, the goal statement was amended to read:

> Support proper care of healthy, native trees across the region to increase their resilience to natural hazards including severe storms, flooding, erosion, and extreme heat. Limit the impact of fallen and other hazardous trees by collaborating with utility companies and property owners to cut limbs and remove trees that pose threats to buildings, infrastructure and utility lifelines.

The Advisory Committee reviewed possible ways to prioritize the hazard mitigation actions. Previously, a modified version of STAPLEE was used. This proved cumbersome and not particularly useful to each jurisdiction. After some discussion a system of ranking mitigation actions into the categories of low, medium, high and very high was agreed upon. In fact, jurisdictions implement actions in the order in which they receive funding, so prioritizing them into these "buckets" makes more sense than in numerical order.

JURISDICTION MEETINGS AND STAKEHOLDER ENGAGEMENT

To include as many jurisdiction specific stakeholders as possible, the Planning Team held a jurisdiction meeting, in each of the fourteen participating jurisdictions. Jurisdiction meetings were scheduled between July 2017 and October 2017, as detailed below in **Table 3-6**. These meetings were organized by the Advisory Committee and usually took place in the City/Town Hall. The Planning Team met with stakeholders identified by the Advisory Committee, to ensure that each jurisdiction had the opportunity to participate fully in the mitigation planning process. The agenda and sign-in sheets for each meeting is included in Appendix A. The table below indicates the date each meeting was held.

Table 3-6 Jurisdiction Meeting Dates

Jurisdiction	Meeting Date
Bethany	July 31, 2017
Branford	July 27, 2017
East Haven	August 3, 2017
Guilford	July 26, 2017
Hamden	August 23, 2017
Madison	August 14, 2017
Milford	August 2, 2017
New Haven	July 25, 2017
North Branford	August 2, 2017
North Haven	July 27, 2017
Orange	October 4, 2017
Wallingford	August 3, 2017
West Haven	July 25, 2017
Woodbridge	July 31, 2017

Figure 3-11 Jurisdiction Meetings

Each Advisory Committee member organized the meeting for their jurisdiction. They were encouraged to review the provided list of potential stakeholders and include as many of them as possible. Each meeting took between one and two hours. The agenda featured a review of the planning process and then focused on specifics in each jurisdiction. The Problem Statements developed for the 2014 plan were distributed along with the mitigation actions from the previous plan. These documents helped structure the meeting and proved truly useful. The main topics covered in each meeting were:

- High Hazards
- Geographic Areas of Risk
- Vulnerable Assets and Critical Facilities
- Land Use Practices and Capability Changes
- Mitigation Actions

The most common theme throughout the jurisdictions was the hazard presented by trees. Most them were dealing with diseased trees and all of them were concerned with trees and tree limbs coming down onto wires and

roadways during storms. The specific information collected from each meeting helped form the Risk Assessment, Capability Assessment and Mitigation Strategy.

PUBLIC PARTICIPATION

A3. Does the Plan document how the public was involved in the planning process during the drafting stage? (Requirement §201.6(b)(1))

The public had multiple opportunities to participate in the planning process, the opportunities are described below.

SCRCOG WEBSITE

The SCRCOG website was used for the previous planning process, and has been used since then for all topics related to risk mitigation in the region. Under the Regional Planning heading on the homepage is the Hazard Mitigation page link. This page includes the current planning process Fact Sheet, information about FEMA Flood Mitigation Assistance and Pre-Disaster Mitigation grants. A link to the 2014 plan is on the page, complete with appendices. Drop down menus lead to meeting agendas and presentations, resources, Community Rating System (CRS) information and dam removal resources. The Advisory Committee was encouraged to have all municipal web pages' link directly to the regional mitigation page at http://scrcog.org/regional-planning/regional-hazard-mitigation.

SURVEY

An opportunity for public participation was developed through the *South Central Connecticut Hazard Mitigation Plan Survey*. The twenty-question survey was produced in Survey Monkey in English and in Spanish. The survey, and complete results, are available for review in Appendix A. The survey was live from September 2017 through February 2018. It was determined at the New Haven Jurisdiction Meeting that developing the survey in Spanish was necessary. Unfortunately, no one took the survey in Spanish. This may be due to the fact that New Haven completed their previous mitigation plan in April 2017 and the public was surveyed for that plan. The survey was organized into three sections, 1) Natural Hazards and Community Vulnerabilities, 2) Personal Preparedness and Mitigating Risk, and 3) A Little About You. Outreach for the survey included announcements on jurisdiction websites and the SCRCOG website and press releases sent to the New Haven Register, Northeast News Today and many local papers.

SURVEY RESULTS

Two hundred seven people completed the survey in English. Twenty-nine percent of respondents live in Branford and twenty-three percent in Hamden, all of the other jurisdictions had participation at a low rate. Fifty-six percent of respondents were over 60 years old, are not seasonal residents, and have a household income above $150,000 a year. They also live inland, with only thirty-six percent of respondents considering their home to be coastal.

Survey results help to guide the Advisory Committee toward mitigation actions and to a deeper understanding of how respondents view their level of risk and their interest in mitigation and preparedness. Respondents had an opportunity to list specific areas in their community vulnerable to natural hazards. This list was reviewed for the risk assessment and mitigation strategy portions of the planning process. The survey asked about their attitude toward climate change and 89% responded positively to the statement, "storms are increasing in frequency and severity and we should plan accordingly."

Figure 3-12 Public Meetings Slide

In terms of mitigating risk, respondents had the choice of choosing their priority for ways their community could reduce risk. Ninety-two percent chose Natural Systems Protection first followed by Local Plans and Regulations, Education and Awareness and finally Structure and Infrastructure Projects. In contrast, when asked about steps their local government could take to mitigate risk they chose structure and infrastructure projects as their top choice. **Figure 3-13** below indicates the answers to this question.

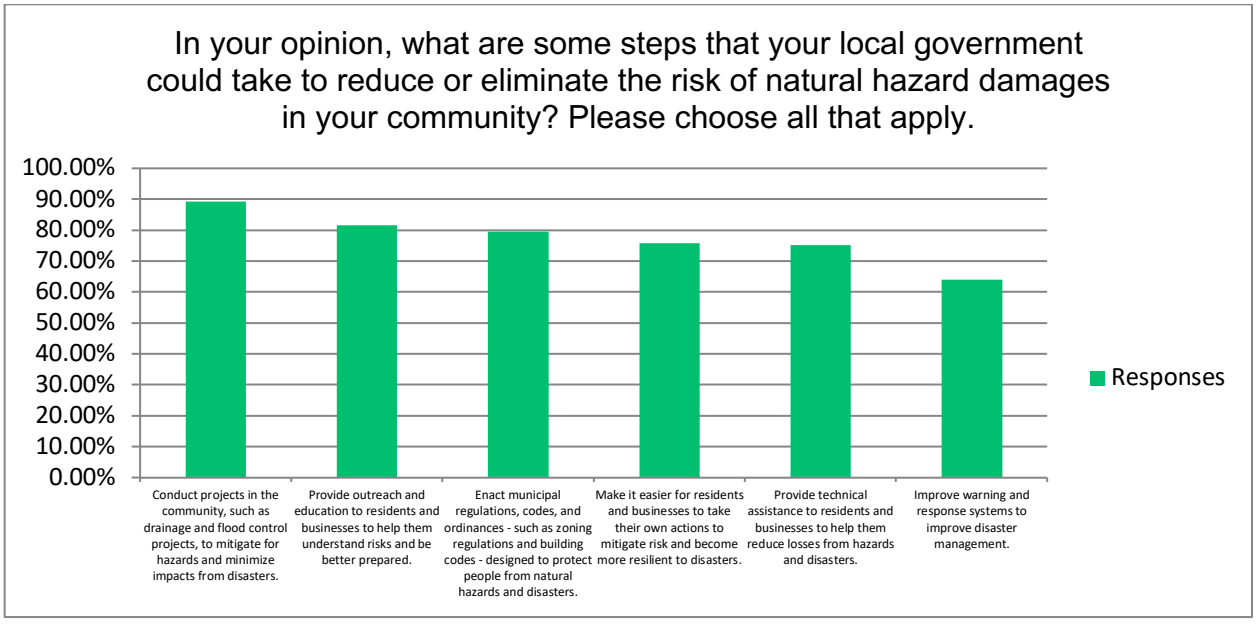


Figure 3-13 Responses to Question 7

PUBLIC MEETINGS

In the previous planning process, public workshops were held on a regional basis. For this planning process, to more fully engage the public in each jurisdiction, the Advisory Committee members agreed to host a public workshop in their jurisdiction once during the planning process. For this public meeting, the consulting team provided a flyer, a press release and a PowerPoint slide presentation (all are available in Appendix A). These

outreach materials were designed as Microsoft Word documents so they were easily customized by the Advisory Committee. The Advisory Committee was encouraged to extend an invitation to their neighboring towns. The slide in Figure 8 below is from the Advisory Committee meeting where the outreach materials were distributed and planning for the public meetings discussed. **Table 3-7** below indicates the date of each meeting and a few notes from the meeting.

Table 3-7 Jurisdiction Public Workshop Schedule

Jurisdiction	Date of Public Meeting	Notes
Bethany	January 18, 2018	Bethany's meeting was the largest with forty-six people in attendance.
Branford	December 6, 2017	Branford's Public Meeting drew participation from Milford, Madison and East Haven.
East Haven	February 22, 2018	Regional Public Meeting held in East Haven.
Guilford	October 3, 2017	Guilford's meeting received a great announcement in the Patch and was attended by twelve people.
Hamden	December 7, 2017	The public meeting in Hamden resulted in several suggestions from the public including a need to fund the Emergency Management position and office, to consider micro grids in the future and to put a representative from the town or SCRCOG on the "Citizen Corp Council" which functions as a liaison between local volunteers in emergency management and FEMA.
Madison	November 2, 2017	Madison's Public Meeting received a nice write-up in ZipO6.com.
Milford	May 22, 2017 & May 24, 2017	Milford held two public meetings related to mitigation actions and the mitigation plan. These were each well attended as captured by the sign-in sheets provided in the Appendix.
New Haven	July 21, 2017	Several meetings were held for the public and these are captured in news articles included in Appendix A. The meetings were held specifically to review flood risk and point residents toward the 15% nationally-nationally subsidized discount on flood insurance the residents in New Haven are eligible for.
North Branford	December 7, 2017	North Branford opened the Planning & Zoning Commission meeting for a public hearing on the hazard mitigation plan.
North Haven	February 22, 2018	Regional Public Meeting held in East Haven.
Orange	March 23, 2018	Part of the Emergency Management Advisory Council Meeting.
Wallingford	December 5, 2017	Held as part of the Local Emergency Planning Committee Annual Meeting and the Disaster Planning Public Meeting. The meetings were well attended by private industry in the Wallingford including Gaylord Hospital, Midstate Medical Center and Ulbrich Steel.

Jurisdiction	Date of Public Meeting	Notes
West Haven	November 14, 2017	West Haven's public hearing was scheduled as part of the Planning & Zoning Commission meeting. The meeting presented an opportunity for Mr. Quadhir to clarify that the plan looks at the shoreline from Kimberly Avenue to the Milford City line, not just the Beach Street area.
Woodbridge	December 5, 2017	The Woodbridge Public Meeting was attended by the a reporter from the Woodbridge Town News who developed an article, included in the Appendix, that outlines the mitigation plan and some specific mitigation actions.

In addition to the jurisdiction specific workshops, a regional public workshop was held on February 22, 2018 at Foxon Firehouse in East Haven. SCRCOG distributed a press release and developed a public notice for this workshop. The Public Notices were in the New Haven Register, LaVoz and Northeast News Today. Copies of these notices are in Appendix A, along with the flyer and press release advertising the workshop and the sign-in sheet. North Haven and East Haven had not previously held public meetings so this location was chosen to capture the public from each town. The Planning Team reviewed the scope of the plan and presented risk assessment conclusions and possible mitigation actions. Several members of the tree alliance in Hamden were in attendance and brought our attention to the value of keeping trees to mitigate risk. They emphasized their concern about tree cutting to reduce risk from high winds, ice, and snow events. They sought to raise awareness that cutting trees increases risk to drought, high heat and other hazards as well as taking away the charm of Connecticut.

INVOLVEMENT OF ADDITIONAL STAKEHOLDERS

A2. Does the Plan document an opportunity for neighboring communities, local and regional agencies involved in hazard mitigation activities, agencies that have the authority to regulate development as well as other interests to be involved in the planning process? (Requirement §201.6(b)(2))

Through the public outreach strategy, multiple agencies and neighboring communities had the opportunity to participate in the planning process. The Planning Team made a list of potential stakeholders at the beginning of the planning process. The Planning Team reached out specifically to the following organizations, who each had an opportunity to review the draft plan and participate in the planning process:

East Shore District Health Department

Brianna Weller, Public Health Emergency Coordinator for East Shore District Health Department attended all of the jurisdiction meetings in her district, Branford, East Haven, and North Branford. She offered advice on outreach in these towns and made the Planning Team aware of the Hurricane Perceptions of Coastal Connecticut Residents study conducted by Yale's project on Climate Change Communication. (The study can be found here: http://climatecommunication.yale.edu/wp-content/uploads/2015/03/Coastal_Storm_Survey_Report_2015Mar20.pdf)

Eversource

Cathy Lezon, Community Relations and Economic Development from Eversource was actively involved in the first multi-jurisdiction plan and was involved again in the development of the update. She outlined for the Planning Team the four types of system resiliency and how Eversource works with their communities. More information about Eversource is in Chapter 2 Planning Area Profile.

Greater New Haven Water Pollution Control Authority

Isabella Schroeder, Senior Engineer for Greater New Haven Water Pollution Control Authority (GNHWPCA) was an active participant in the Planning Process. GNHWPCA was awarded a FEMA HMGP grant to implement resiliency improvements at four coastal pump stations in East Haven. On November 16, 2017 the GNHWPCA hosted a meeting at their offices in New Haven for the Planning Team. GNHWPCA emphasized how they want to be an active participant in mitigating risk in the region and offered to review draft documents and assist with development of mitigation actions. More information about the GNHWPCA is located in Chapter 2 Planning Area Profile.

League of Women Voters and Hamden/North Haven Tree Commission

Diane Hoffman, representing both the Hamden Tree Commission and the League of Women Voters became actively involved in the mitigation planning process. The Planning Team had in-person and email contact with her and she attended several meetings. She sent a letter to the Hamden/North Haven League of Women Voters notifying them of the project and the opportunity to participate in public meetings and the survey. She also posted notices on the Save Hamden Trees Facebook page and the Spring Glen Progressive Action Facebook page.

A letter Ms. Hoffman shared with the League of Women Voters is in Appendix A. Ms. Hoffman emphasized the following points regarding trees in Hamden.

- A Harvard University report recently released says that "Connecticut is losing about 3,700 acres of forest a year to development and New England as a whole is seeing its woodlands disappear at a rate of 65 acres a day."
- a document provided by our local electric company, United Illuminating, as part of the Public Utility Regulatory Authority (PURA) Docket 16-12-37 states that of 1460 trees removed in Hamden in 2016, 137 were hazard trees. Therefore 1323 were not hazard trees.

Nature Conservancy

Adam Whelchel, Director of Science at the Nature Conservancy participated in this planning effort as well as the previous planning effort. The Planning Team spoke with Mr. Whelchel early in the planning process to discuss current activities the Nature Conservancy was undertaking in the region. The Nature Conservancy took a lead role in the development of the Southern Connecticut Regional Framework for Coastal Resilience. Mr. Whelchel shared the draft materials from this project. The Southern Connecticut Regional Framework for Coastal Resilience is reviewed in the Capability Assessment and was reviewed for mitigation actions that may be found in the Mitigation Strategy.

United Illuminating

Bill Richards, Recovery Coordinator and Deputy Director of Emergency Management in the City of Milford assisted the Planning Team with getting a copy of United Illuminating's Emergency Response Plan, July 1, 2017. This plan details their pre-event preparations as well as restoration philosophy, roles and responsibilities and compliance information. Similarly to Eversource, United Illuminating is actively working to mitigate the risk trees present to power lines. Additional information about United Illuminating is in Chapter 2 Planning Area Profile.

REVIEW AND COMMENT ON THE PLAN

Digital copies of the Plan were distributed to the SCRCOG Board of Directors and to members of the Advisory Committee for review prior to adoption. A digital copy of the Plan was posted on the SCRCOG website for public comment and review for two weeks beginning April 30, 2018. Many jurisdictions added a link to the Plan on their City or Town website. The Planning Team provided the Advisory Committee with a press release (included in Appendix A) announcing the availability of the Plan for public review. Comments collected were used to amend the Plan when agreed upon by the Advisory Committee.

Additional comments received are also in Appendix A.

PLAN ADOPTION

E2. For multi-jurisdictional plans, has each jurisdiction requesting approval of the plan documented formal plan adoption? (Requirement §201.6(c)(5))

Following FEMA's Approved Pending Adoption notification, each jurisdiction met to formally adopt the Plan. All adoption certificates are in included in the front of the Plan.

CHAPTER 4. RISK ASSESSMENT

The South Central Region is vulnerable to a wide range of hazards that threaten life and property. Current regulations and FEMA guidance require, at a minimum, a description and evaluation of all natural hazards that affect the municipalities in the planning area. An evaluation of technological or human-caused hazards is encouraged, though not required, for plan approval. The South Central Region has focused solely on natural hazards at this time. Incorporation of other hazards may be evaluated in future versions of the plan, which will be monitored, evaluated and updated regularly.

Upon a review of the full range of natural hazards included in FEMA planning guidance, SCRCOG initially identified a number of potential hazards to be addressed in the first edition of the South Central Region Multi-Jurisdiction Hazard Mitigation Plan. These hazards were identified through an extensive process that considered input from Advisory Committee members, research of past disaster declarations in New Haven County, a review of Connecticut's 2010 Natural Hazard Mitigation Plan Update, and reviews of local hazard mitigation plans for neighboring jurisdictions. Readily available information from reputable sources, including federal and state agencies, was also evaluated to supplement information provided by these primary sources.

Subsequent to the planning process associated with the first edition of the South Central Region Multi-Jurisdiction Hazard Mitigation Plan, the State of Connecticut adopted an update to its Natural Hazard Mitigation Plan in January 2014. The 2014 edition of the State's plan has been used to update certain aspects of the hazard assessment in the South Central Region Multi-Jurisdiction Hazard Mitigation Plan Update.

Table 4-8 summarizes the full range of potential natural hazards for the South Central Region. This includes 16 individual hazards classified according to four categories (Atmospheric, Hydrologic, Geologic and Other). Some of these hazards are considered to be interrelated or cascading (i.e., hurricanes may cause flooding and tornadoes, drought conditions may increase the likelihood of wildfires), but for preliminary hazard identification purposes these individual hazards are distinguished separately. It should also be noted that some hazards, such as earthquakes or winter storms may impact a large area yet cause little damage, while other hazards, such as a tornado, may impact a small localized area yet cause extensive damage. Descriptive profiles of all hazards deemed significant enough for further analysis are provided in the Hazard Analysis section.

Table 4-8 Potential Natural Hazards for the South Central Region Considered in the Initial Hazard Mitigation Plan

Atmospheric	Hydrologic	Geologic	Other
Extreme Temperatures	Coastal Erosion	Earthquake	Wildfire
Hurricane/Tropical Storm	Dam Failure	Landslide	
Nor'easter	Drought	Soil Hazards *(includes expansion, subsidence, and sinkholes)*	
Severe Thunderstorm *(includes high winds, hail, and lightning)*	Flood *(includes coastal, riverine and urban flooding. Also includes ice jams and storm surge)*	Tsunami	
Severe Winter Storm *(includes snow and ice)*	Sea Level Rise		
Tornado			

Table 4-9 documents the evaluation process used for determining which of the initially identified hazards were significant enough for further study in the risk assessment. The table indicates whether or not the hazard was identified as a significant hazard, how this determination was made, and why this determination was made. Hazard events not identified for inclusion at this time may be addressed during future evaluations and updates of the risk assessment if deemed necessary by the Advisory Committee during the plan update process.

Table 4-9 Initial Evaluations of Potential Natural Hazards for the South Central Region

Potential Natural Hazard	Significant Enough for Further Analysis in Initial HMP?	How was determination made in Initial HMP?	Why was determination made in the Initial HMP?	Does the CT Hazard Mitigation Plan Update (2014) Necessitate A Change in Status?
ATMOSPHERIC				
Extreme Temperatures	**YES**	• Recommended for further evaluation by Advisory Committee • Review of local hazard mitigation plans for neighboring jurisdictions • Review of NOAA historical event data	• Frequency of previous occurrences (extreme heat and extreme cold) • Potential life/safety threat for vulnerable populations • Potential for increased frequency, duration and intensity of extreme heat due to the effects of climate change	NO (the CT HMP does not address extreme temperatures in its hazard assessment, but SCRCOG may include hazards that are not in the CT HMP)
Hurricane/Tropical Storm	**YES**	• Review of State Hazard Mitigation Plan • Review of Federal disaster declaration history • Use of NOAA Digital Coast (Historical Hurricane Tracks)	• Recent local experience (Sandy, 2012, Irene in 2011, Hanna in 2008), and history of major, destructive storms in the past century • Identified as significant hazard for coastal and inland communities in the State Hazard Mitigation Plan • NOAA historical records indicate that 43 storm tracks have come within 65 miles of the planning area since 1858 (annual probability of 28%) • Potential to cause severe, extensive damage and disruption	NO
Nor'easter	**YES** (Will be combined with Severe Winter Storm)	• Review of State Hazard Mitigation Plan • Review of Federal disaster declaration history • Review of local hazard mitigation plans for neighboring jurisdictions	• Frequency of previous occurrences • Recent historical events have caused fatalities, injuries and property damage	NO

Potential Natural Hazard	Significant Enough for Further Analysis in Initial HMP?	How was determination made in Initial HMP?	Why was determination made in the Initial HMP?	Does the CT Hazard Mitigation Plan Update (2014) Necessitate A Change in Status?
			• Potential to cause severe, extensive damage and disruption – particularly along coastal areas	
Severe Thunderstorm *(includes high winds, hail, and lightning)*	**YES**	• Review of NOAA historical event data	• Frequency of previous occurrences NOAA historical records include 326 severe thunderstorm events in the region since 1955, causing fatalities, injuries and property damage	NO
Severe Winter Storm *(includes snow and ice)*	**YES** (Will be combined with Nor'easter)	• Review of State Hazard Mitigation Plan • Review of Federal disaster declaration history • Review of local hazard mitigation plans for neighboring jurisdictions • Review of NOAA historical event data	• Frequency of previous occurrences • NOAA historical records include 20 severe winter storm events since 1996 resulting in property damages • Multiple Federal Disaster and/or Emergency Declarations	NO
Tornado	**YES**	• Review of State Hazard Mitigation Plan • Review of Federal disaster declaration history • Review of NOAA historical event data and National Severe Storms Laboratory (NSSL) website	• NOAA historical records include 15 tornado events in the region since 1955, causing fatalities, injuries and property damage – including a devastating F4 tornado that struck Hamden in 1989 • Significant life/safety threat	NO
HYDROLOGIC				
Coastal Erosion	**YES**	• Identified as significant hazard concern in Branford, Madison and West Haven • Review of CT DEEP data on Erosion Susceptibility and Erosion Sites	• Erosion is a chronic condition along most shoreline areas in the region • Frequency of rapid, episodic erosion caused by storm events • Coastal and upland property is becoming more exposed to coastal flood hazards due to erosion	NO
Dam Failure	**YES**	• Review of State Hazard Mitigation Plan	• History of dam failure occurrences in Connecticut causing	NO

Potential Natural Hazard	Significant Enough for Further Analysis in Initial HMP?	How was determination made in Initial HMP?	Why was determination made in the Initial HMP?	Does the CT Hazard Mitigation Plan Update (2014) Necessitate A Change in Status?
		• Review of CT DEEP inventory of state-regulated dams • Review of National Performance of Dams Program Inventory (Stanford University)	multiple casualties and severe damage • 198 dams are located in the planning area (ten participating jurisdictions), with 47 dams classified as significant or high hazard potential Significant life/safety threat	
Drought	**YES**	• Review of State Hazard Mitigation Plan • Review of National Drought Mitigation Center website and Palmer Drought Severity Index (PDSI)	• There have been 5 severe droughts to impact Connecticut since 1929 per the State Hazard Mitigation Plan • According to the PDSI, the planning area is located in a region that experienced severe drought conditions 5-10% of the time during a 100-year period • Potential for increased frequency, duration and severity of drought events due to the effects of climate change • Future droughts may severely impact reservoirs and other sources of water supply	NO
Flood *(includes coastal, riverine and urban flooding. Also includes ice jams and storm surge)*	**YES**	• Review of State Hazard Mitigation Plan • Review of Federal disaster declaration history • Review of FEMA Digital Flood Insurance Rate Maps • Review of NOAA historical event data • Review of FEMA NFIP policy and claims statistics • Use of CT DEEP Coastal Hazards Viewer (for storm surge)	• Flood identified as the most prevalent and frequent hazard in Connecticut per the State Hazard Mitigation Plan • Special flood hazard areas have been identified and mapped by FEMA for coastal and inland areas of the region • Multiple Federal Disaster and/or Emergency Declarations • Frequency of previous flood occurrences in the region. NOAA historical records include 89 flood events in the region since 1993, causing fatalities and property damage	NO

Potential Natural Hazard	Significant Enough for Further Analysis in Initial HMP?	How was determination made in Initial HMP?	Why was determination made in the Initial HMP?	Does the CT Hazard Mitigation Plan Update (2014) Necessitate A Change in Status?
			• FEMA NFIP claims statistics report 2,453 reported flood losses for costing more than $25 million in claims in the planning area (ten participating jurisdictions)	
Sea Level Rise	**YES**	• Use of The Nature Conservancy's Coastal Resilience Mapping Tool • Use of CT DEEP Coastal Hazards Viewer • Review of State Hazard Mitigation Plan • Review of local hazard mitigation plans for neighboring jurisdictions	• Visualization of potential future flood scenarios indicates potential inundation for planning area (Branford, Madison, West Haven)	NO
GEOLOGIC				
Earthquake	**YES**	• Review of State Hazard Mitigation Plan • Review of USGS data on historic earthquake events • Review of USGS hazard maps • Review of earthquake hazard information provided by the Northeast States Emergency Consortium • Review of NOAA National Geophysical Data Center (NGDC) Earthquake Intensity Database	• History of seismic activity in the state (140 since 1958 – all low magnitude events) • The New Haven-Greenwich area is one of two areas in the state identified as most vulnerable to earthquakes per the State Hazard Mitigation Plan • While considered a low probability event, the potential impacts of moderate earthquake event (MMI II-V) could be substantial, particularly for older and unreinforced masonry buildings built on fill or unstable soil	NO
Landslide	**NO**	• Review of USGS Landslide Incidence and Susceptibility Map • Review of NOAA historical event data • Discussions with Advisory Committee and local municipal staff • Review of Public Opinion Survey results	• No historic landslide occurrences recorded in the planning area according to USGS and NOAA data • USGS hazard map shows low landslide incidence/ susceptibility for the planning area, with the exception of West Haven	NO

Potential Natural Hazard	Significant Enough for Further Analysis in Initial HMP?	How was determination made in Initial HMP?	Why was determination made in the Initial HMP?	Does the CT Hazard Mitigation Plan Update (2014) Necessitate A Change in Status?
			(moderate incidence/ susceptibility) • Not identified as significant hazard of concern by local officials or citizens in response to Public Opinion Survey	
Soil Hazards *(includes expansion, subsidence, & sinkholes)*	**NO**	• Review of local hazard mitigation plans for neighboring jurisdictions • Discussions with Advisory Committee and local municipal staff • Review of Public Opinion Survey results	• No documented history of previous occurrences causing damage in the region • Not identified as significant hazard of concern by local officials or citizens in response to Public Opinion Survey	NO
Tsunami	**NO**	• Review of State Hazard Mitigation Plan • Review of NOAA Digital Coast (Tsunami Prone Map) • Review of NGDC/WDS Global Historical Tsunami Database	• No history of previous tsunami occurrences affecting Connecticut • Tsunamis present an "extremely small risk" of impacting Connecticut, per the State Hazard Mitigation Plan	NO
OTHER				
Wildfire	**YES**	• Review of State Hazard Mitigation Plan • Review of Connecticut's Forest Resource Assessment and Strategy (2010) • Review of Connecticut Wildland Urban Interface Map (University of Wisconsin, SILVIS Lab)	• Frequency of previous occurrences, although most are small and suppressed early (burning less than 10 acres) • Large amount of wildland/urban interface and intermix areas in the region • Potential for increased frequency and intensity of wildfire events due to the effects of climate change • The introduction of disease, pests and invasive plants increases vegetative fuel loads in wildland areas	NO

HAZARD ANALYSIS

B1. Does the Plan include a description of the type, location, and extent of all natural hazards that can effect each jurisdiction (s)? FEMA Requirement §201.6(c)(2)(i)

B2. Does the Plan include information on previous occurrences of hazard events and on the probability of future hazard events for each jurisdiction? §201.6(c)(2)(i)

The Hazard Analysis section provides detailed descriptions of each natural hazard deemed significant enough (through Hazard Identification) for further study in the risk assessment.

Complete hazard profiles are available for the following 12 hazards; whereas soil hazards, landslides, and tsunamis are not profiled based on the screening described above:

- Extreme Temperatures
- Hurricane/Tropical Storm
- Severe Thunderstorm
- Severe Winter Storm/Nor'easter
- Tornado
- Coastal Erosion
- Dam Failure
- Drought
- Flood
- Sea Level Rise
- Earthquake
- Wildfire

Each hazard profile includes a summary account of the following:

- **Description:** Provides general definitions and brief descriptions of the hazard, its characteristics and potential effects.
- **Location:** Provides information on the geographic areas within the planning area that are susceptible to occurrences of the hazard.
- **Extent:** Provides information on the potential strength or magnitude of the hazard.
- Previous Occurrences: Provides information on the history of previous hazard events in the planning area, including their impacts on people and property.
- **Probability of Future Events:** Describes the likelihood of future hazard occurrences in the planning area. This includes a summary of any anticipated effects that climate change may have on the frequency, duration and intensity of future hazard events according to the U.S. Global Change Research Program and reports by the Connecticut Governor's Steering Committee on Climate Change. A brief overall summary of these effects in the Northeast region is provided below.

THE EFFECTS OF CLIMATE CHANGE IN THE NORTHEAST UNITED STATES

The Northeast annual average temperature has increased by 2°F since 1970, with winter temperatures rising twice this much. Warming has resulted in many other climate-related changes including more frequent very hot days, a longer growing season, an increase in heavy downpours, less winter precipitation falling as snow and more as rain, reduced snowpack, earlier break-up of winter ice on lakes and rivers, earlier spring snowmelt resulting in earlier

peak river flows, rising sea surface temperatures, and rising sea level. These trends are projected to continue, with more dramatic changes under higher emissions scenarios compared to lower emissions scenarios. Some of the extensive climate-related changes projected for the region could significantly alter the region's economy, landscape, character, and quality of life.[164]

Subsequent to the development of the initial SCRCOG Multi-Jurisdiction Hazard Mitigation Plan: the Connecticut Natural Hazard Mitigation Plan Update (2014) was adopted with an enhanced discussion relative to climate change; the State established the Connecticut Institute for Resilience and Climate Adaption (CIRCA); and the Water Planning Council supervised the development of the State Water Plan (2018) with a chapter devoted to Climate Change. The conclusions of the Connecticut Natural Hazard Mitigation Plan Update and State Water Plan include statements regarding the impacts of climate change on floods, droughts, tropical storms and hurricanes, severe winter storms, thunderstorms, and wildfires. This information is presented in the subsections of this chapter within the discussion of each hazard.

SUMMARY OF MAJOR DISASTER AND EMERGENCY DECLARATIONS

Prior to completing the hazard-by-hazard analysis, it is important to note and document past major disaster and emergency declarations that have included the SCRCOG Region. Major disaster and emergency declarations are issued by the President of the United States at a county level when an event has been determined to be beyond the capabilities and resources of state and local governments to respond and recover. A *major disaster declaration* is issued as a result of the disaster or catastrophic event and constitutes a broader authority that helps states and local communities, as well as families and individuals, recover from the damage caused by the event. An *emergency declaration* is issued to protect property and public health and safety and to lessen or avert the imminent threat of a major disaster or catastrophe.

From 1953 (the first year that presidential declarations were issued) through the year of initial plan development (2013), New Haven County (which completely contains the SCRCOG Region) had been included in 12 major disaster declarations and 11 emergency declarations (**Table 4-10**). Many additional emergencies and disasters have occurred that were not severe enough to require federal disaster relief through a presidential declaration. Since 2013, only one additional disaster declaration has occurred.

Table 4-10 Major Disaster and Emergency Declarations, 1953-2018

Major Disaster Declarations		Emergency Declarations	
Date	**Description**	**Date**	**Description**
8/20/1955	Hurricane, Torrential Rain & Floods	2/7/1978	Blizzard & Snowstorms
6/14/1982	Severe Storms & Flooding	3/16/1993	Severe Winds & Blizzard, Record Snowfall

[164] United States Global Change Research Program. Global Climate Change Impacts in the United States, Thomas R. Karl, Jerry M. Melillo, and Thomas C. Peterson, (eds.). Cambridge University Press, 2009.

Major Disaster Declarations		Emergency Declarations	
Date	**Description**	**Date**	**Description**
6/18/1984	Severe Storms & Flooding	3/11/2003	Snowstorm
10/11/1985	Hurricane Gloria	1/15/2004	Snow
7/18/1989	Severe Storms & Tornadoes	2/17/2005	Snow
9/16/1991	Hurricane Bob	9/13/2005	Hurricane Katrina Evacuation
12/17/1992	Winter Storm & Coastal Flooding	5/2/2006	Snow
02/02/1996	Blizzard of '96	8/27/2011	Hurricane Irene
5/11/2007	Severe Storms and Flooding	10/31/2011	Severe Storm
3/3/2011	Snowstorm	10/28/2012	Hurricane Sandy
9/2/2011	Tropical Storm Irene	2/10/2013	Severe Winter Storm
10/30/2012	Hurricane Sandy	1/29/2015	Severe Winter Storm & Snowstorm
3/21/2013	Severe Winter Storm & Snowstorm	3/14/2017	CT Civil Preparedness Emergency
4/07/2015	Severe Winter Storm and Snowstorm		

Source: Federal Emergency Management Agency

Under a presidential declaration, state and affected local jurisdictions are eligible to apply for federal reimbursement of up to 75-percent of approved costs for debris removal, emergency services related to the storm, and the repair or replacement of damaged public facilities. Funding is also made available for implementing hazard mitigation measures, including those identified in local hazard mitigation plans.

EXTREME TEMPERATURES

DESCRIPTION

According to the National Weather Service, extreme temperature (including extreme heat and extreme cold) is the number one weather-related killer in the United States.

Extreme heat may be generally defined as temperatures that hover 10 degrees or more above the average high temperature for the region, last for prolonged periods of time, and are often accompanied by high humidity. At certain levels the human body cannot maintain proper internal temperatures and may experience severe health disorders including heat cramps, heat exhaustion or heatstroke (a life-threatening condition).

Extreme cold may be generally defined as prolonged periods of time with freezing temperatures, often made worse by the impact of wind chill factors (the combined elements of air temperature and wind on exposed skin). At certain levels the human body may suffer from frostbite or hypothermia, making extreme cold a potential severe and life-threatening hazard to people left unprotected from the elements. Freezing temperatures may cause severe damage to crops and other vegetation, and pipes may freeze and burst in structures that are poorly insulated or without heat. Long cold spells may cause rivers and lakes to freeze and lead to ice jams that can act as a dam, resulting in severe flooding (covered under *Flood*).

LOCATION

The entire planning area is susceptible to the occurrence of extreme temperatures. In general, inland areas are more susceptible to extreme heat and cold than coastal areas.

EXTENT

The National Weather Service's Heat Index is a measure of the effects of the combined elements of air temperature and relative humidity on the human body, particularly for people in higher risk groups (elderly persons, young children, persons with respiratory difficulties, and those who are sick or overweight). **Table 4-11** summarizes the extent of these effects.

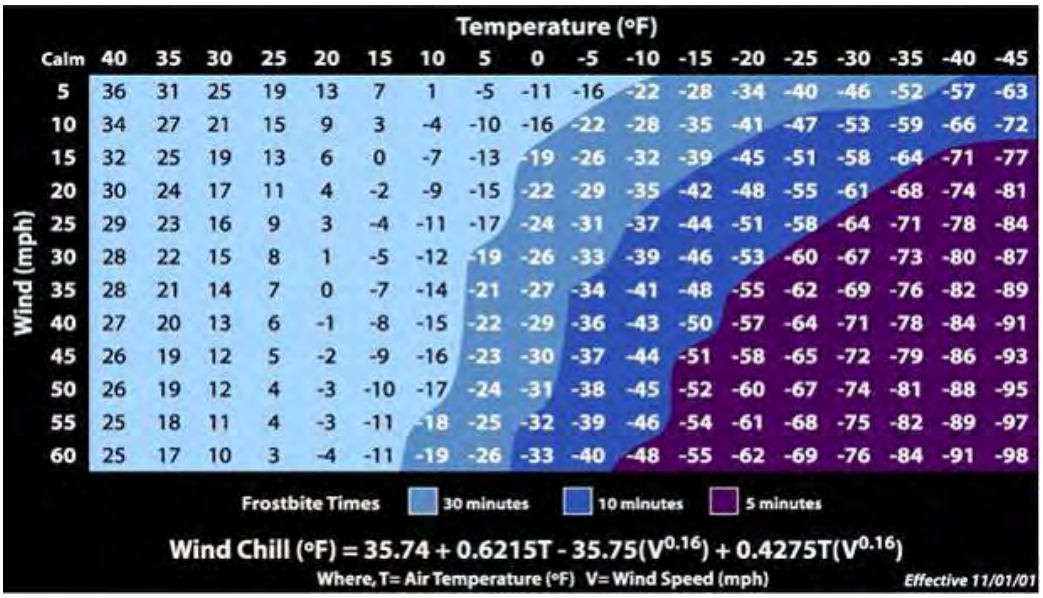
Table 4-11 Effects of Extreme Heat on the Human Body

Heat Index	Heat Disorder
80–89° F	Fatigue possible with prolonged exposure and/or physical activity.
90–104° F	Sunstroke, heat cramps and heat exhaustion possible with prolonged exposure and/or physical activity.
105–129° F	Sunstroke, heat cramps or heat exhaustion likely, and heatstroke possible with prolonged exposure and/or physical activity.
130° F and Higher	Heatstroke/sunstroke highly higher likely with continued exposure.

Source: National Oceanic and Atmospheric Administration

The National Weather Service's Wind Chill Index is used to measure the dangers of frostbite caused by the combined elements of freezing temperatures and wind. **Table 4-12** summarizes the extent of this effect.

Table 4-12 Effects of Extreme Cold on the Human Body



Wind (mph) \ Temperature (°F)	Calm	40	35	30	25	20	15	10	5	0	-5	-10	-15	-20	-25	-30	-35	-40	-45
5		36	31	25	19	13	7	1	-5	-11	-16	-22	-28	-34	-40	-46	-52	-57	-63
10		34	27	21	15	9	3	-4	-10	-16	-22	-28	-35	-41	-47	-53	-59	-66	-72
15		32	25	19	13	6	0	-7	-13	-19	-26	-32	-39	-45	-51	-58	-64	-71	-77
20		30	24	17	11	4	-2	-9	-15	-22	-29	-35	-42	-48	-55	-61	-68	-74	-81
25		29	23	16	9	3	-4	-11	-17	-24	-31	-37	-44	-51	-58	-64	-71	-78	-84
30		28	22	15	8	1	-5	-12	-19	-26	-33	-39	-46	-53	-60	-67	-73	-80	-87
35		28	21	14	7	0	-7	-14	-21	-27	-34	-41	-48	-55	-62	-69	-76	-82	-89
40		27	20	13	6	-1	-8	-15	-22	-29	-36	-43	-50	-57	-64	-71	-78	-84	-91
45		26	19	12	5	-2	-9	-16	-23	-30	-37	-44	-51	-58	-65	-72	-79	-86	-93
50		26	19	12	4	-3	-10	-17	-24	-31	-38	-45	-52	-60	-67	-74	-81	-88	-95
55		25	18	11	4	-3	-11	-18	-25	-32	-39	-46	-54	-61	-68	-75	-82	-89	-97
60		25	17	10	3	-4	-11	-19	-26	-33	-40	-48	-55	-62	-69	-76	-84	-91	-98

Source: NOAA, 2013 and 2017

PREVIOUS OCCURRENCES

NOAA historical records indicate that there have been no fatalities in the planning area due to extreme temperatures from 1995 through 2016. Only 1 fatality (heat related) was recorded for Connecticut, outside the planning area, during this period (2002).

While summers are humid and very warm, temperatures rarely exceed 100° F and only exceed 90°F on 7-8 days per year. In the summer of 1999, Connecticut experienced extreme heat for a period of 3-5 consecutive days over 100 degrees making it the most severe heat wave on record. The highest recorded ambient temperature for the region is 103°F.

Freezing temperatures are common throughout the region during winter months, with average low temperatures falling below 30°F from December through February. The lowest recorded ambient temperature for the region is -24°F.

Notable recent occurrences in the planning area include:

- August 12-13, 2016 – Hot temperatures along with high humidity resulted in a heat index of 108°F at Meriden Airport.
- February 15-16, 2015 – Strong northwest winds and frigid air in the wake of an intense storm over the Canadian Maritimes combined to produce dangerous wind chills across parts of interior southern Connecticut. Wind chills fell to 28 degrees below zero at 3 AM at Waterbury-Oxford Airport.
- July 19, 2013 – The combination of high heat and humidity resulted in a heat index of 105°F at Meriden Airport.

- July 18, 2012 – The heat index reached or exceeded 106°F at Meriden Markham Municipal airport.
- July 22-23, 2011 – An oppressive hot and humid air mass produced excessive heat that resulted in daytime temperatures 95 to 105 degrees. The heat index was as high as 108°F at Tweed Airport in New Haven. No fatalities or injuries were attributed to this event.

PROBABILITY OF FUTURE EVENTS

Extreme temperatures will continue to be a likely occurrence in the planning area. It is anticipated that the effects of climate change will result in an increase in the frequency, duration and intensity of extreme heat events, and a decrease in the frequency of extreme cold events. Heat waves are projected to become much more commonplace in a warmer future with potentially major implications for human health.

HURRICANE/TROPICAL STORM

DESCRIPTION

Hurricanes and tropical storms are classified as cyclones and defined as any closed circulation of winds developing around a low-pressure center in which the winds rotate counter-clockwise (in the Northern Hemisphere) and with a diameter averaging 10 to 30 miles across. When maximum sustained winds reach or exceed 39 miles per hour, the system is designated a tropical storm, given a name, and is closely monitored by the National Hurricane Center. When sustained winds reach or exceed 74 miles per hour the storm is deemed a hurricane. The primary damaging forces associated with these storms are high-level sustained winds, heavy precipitation, and tornadoes. Coastal areas are also vulnerable to the additional forces of storm surge, wind-driven waves, and tidal flooding which can be more destructive than cyclone wind. The majority of hurricanes and tropical storms form in the Atlantic Ocean, Caribbean Sea, and Gulf of Mexico during the official Atlantic hurricane season, which extends from June through November.

LOCATION

The entire planning area is susceptible to the occurrence of hurricanes and tropical storms. Coastal areas are more susceptible to the forces of storm surge and tidal flooding (covered under *Flood*).

EXTENT

The National Weather Service's Saffir-Simpson Hurricane Wind Scale, shown in **Table 4-13**, is used to categorize the strength and magnitude of hurricane events according to sustained wind speed, and also provides estimates of potential property damage.

Table 4-13 Saffir-Simpson Hurricane Wind Scale

Category	Sustained Winds	Types of Damage Due to Hurricane Winds
1	74–95 mph	**Very dangerous winds will produce some damage:** Well-constructed frame homes could have damage to roof, shingles, vinyl siding and gutters. Large branches of trees will snap and shallowly rooted trees may be toppled. Extensive damage to power lines and poles likely will result in power outages that could last a few to several days.
2	96–110 mph	**Extremely dangerous winds will cause extensive damage:** Well-constructed frame homes could sustain major roof and siding damage. Many shallowly rooted trees will be snapped or uprooted and block numerous roads. Near-total power loss is expected with outages that could last from several days to weeks.
3 (major)	111–129 mph	**Devastating damage will occur:** Well-built framed homes may incur major damage or removal of roof decking and gable ends. Many trees will be snapped or uprooted, blocking numerous roads. Electricity and water will be unavailable for several days to weeks after the storm passes.
4 (major)	130–156 mph	**Catastrophic damage will occur:** Well-built framed homes can sustain severe damage with loss of most of the roof structure and/or some exterior walls. Most trees will be snapped or uprooted and power poles downed. Fallen trees and power poles will isolate residential areas. Power outages will last weeks to possibly months. Most of the area will be uninhabitable for weeks or months.

Source: National Oceanic and Atmospheric Administration

Southern New England is particularly prone to Tropical Storms and Tropical Depressions. These storms have wind speeds less than a Category 1 Hurricane.

- Tropical Storm 39 – 73 mph
- Tropical Depression 38 mph or less

PREVIOUS OCCURRENCES

According to NOAA historical records, 33 hurricane/tropical storm tracks have come within 75 miles of New Haven since 1842. This includes 24 tropical storms, seven Category 1 hurricanes, three Category 2 hurricanes, and three Category 3 hurricanes (note that storms that change in intensity are counted multiple times, once for each intensity level). **Figure 4-14** shows the historical tracks of these storms, some of which are further described below. The map does not include the tracks of an additional extra-tropical systems or tropical depressions that also came within 75 miles of the planning area.

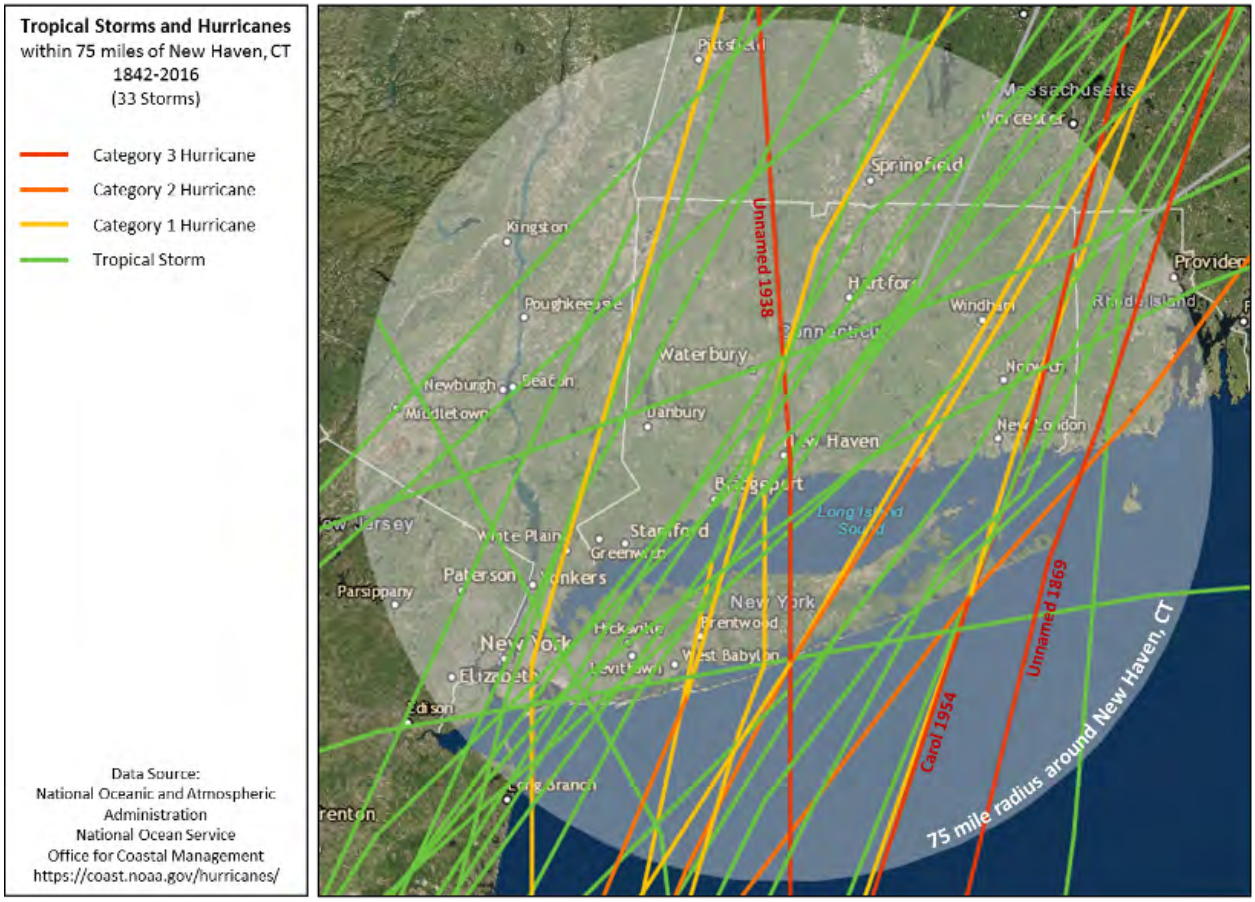


Figure 4-14 Historical Storm Tracks

Notable recent occurrences in the planning area include:

- October 29-30, 2012 (Hurricane Sandy) – Hurricane Sandy, with a wind diameter stretching more than 1,000 miles, became the largest Atlantic hurricane on record and is estimated to be the second costliest in history, only surpassed by Hurricane Katrina in 2005. The storm made landfall as a "post-tropical cyclone" in Atlantic City, New Jersey with sustained winds of 90 miles per hour and a devastating storm surge for communities in the tri-state area. Its effects were directly felt in the South Central Region, with damaging winds and storm surge that caused extensive flooding and erosion along the immediate shoreline (covered under *Flood*).
- August 28, 2011 (Tropical Storm Irene) – Tropical Storm Irene passed to the west of the planning area, bringing damaging winds, storm surge and coastal flooding (covered under *Flood)* to the planning area. The most significant local impacts to the region caused by tropical storm force winds were downed trees, which resulted in moderate property damages, road closures, communications disruptions (especially cellular networks), and widespread long-term power outages, with some areas going longer than a week before power was restored.

The most intense hurricane to strike Connecticut occurred on September 21, 1938. Known widely as the "New England Hurricane of 1938" or "Long Island Express," the storm made landfall as a Category 3 hurricane near Milford and moved rapidly through New England. The storm generated wind gusts as high as 130 miles per hour, a storm surge up to 18 feet along coastal areas, and up to 17 inches of rainfall in central Connecticut causing severe inland flooding. Overall the storm is estimated to have resulted in 564 fatalities and 1,700 injuries, and $624 million in property damages in Connecticut (2012 dollars).

Other notable historic hurricane and tropical storm events for Connecticut include:

- September 15, 1999 (Tropical Storm Floyd) – The remnants of Tropical Storm Floyd dumped heavy rainfall across Connecticut resulting in widespread flooding, while winds caused many downed trees and power outages throughout New England.
- August 19, 1991 (Hurricane Bob) – Hurricane Bob made landfall as a strong Category 2 hurricane in near Newport, Rhode Island, with winds causing light to moderate damages throughout Connecticut. Coastal and inland flooding was minimal. The storm was blamed for 6 fatalities in the state, and an overall total of approximately $1.1 billion in property damages (2012 dollars) for Southern New England.
- September 27, 1985 (Hurricane Gloria) – Hurricane Gloria made landfall as a Category 2 hurricane in the Westport area, felling thousands of trees and causing minor structural damage across Connecticut. The storm struck at low tide, resulting in low to moderate storm surges along the coast, and did not cause substantial inland flooding due to relatively light rainfall. The amount and spread of vegetative debris and widespread power outages were the greatest impacts caused by the storm.
- August 10, 1976 (Hurricane Belle) – After passing over Long Island as a Category 1 hurricane, Belle made landfall as a Tropical Storm near Stratford. The high winds downed trees and caused widespread power outages, spread moderate to heavy rainfall across the area, and generated a small storm surge that caused minor shoreline damage.
- September 12, 1960 (Hurricane Donna) –Hurricane Donna made landfall as a Category 2 hurricane near Old Lyme, generating a storm surge of up to 10 feet along the coast and moderate rainfall across inland areas.
- August 11-18, 1955 (Tropical Storms Connie and Diane) – The combined effects of these two back-to-back storms caused devastating flooding across Connecticut (covered under *Flood*).
- August 31, 1954 (Hurricane Carol) – Hurricane Carol made landfall as a Category 3 hurricane near Clinton shortly after high tide, producing storm surges of 10 to 15 feet from New London eastward that caused widespread coastal flooding. The combination of strong winds and storm surge damaged or destroyed thousands of buildings across the Northeast. Downed trees caused many damages and power outages across the eastern portion of Connecticut, but the western part of the state suffered little effects due to the compact nature of the storm.
- September 15, 1944 – The "Great Atlantic Hurricane" made landfall as a Category 1 hurricane near New London, bringing strong winds and heavy rainfall across the state. Most of the wind damage occurred in Southeastern portions of the state, though wind gusts over more than 100 miles per hour were recorded in Hartford.
- September 8, 1869 – A major unnamed storm made landfall in southwestern Rhode Island as a Category 3 hurricane. This was a compact storm, estimated at only 60 miles wide, and it quickly weakened over land.

PROBABILITY OF FUTURE EVENTS

Hurricanes and tropical storms will continue to be a likely occurrence in the planning area. Based on historical event data, the annual probability of a hurricane or tropical storm track coming within 75 miles of the planning area is about 20 percent, though the chance of a major hurricane (Category 3-5) at landfall is much less. The effects of climate change on future hurricane and tropical storm events cannot be determined at the present time due to insufficient evidence. The Connecticut Hazard Mitigation Plan (2014) states that "Researchers have recently analyzed data that has indicated that the intensity of tropical cyclones (hurricanes and typhoons) has increased over the last thirty-five years. With changing weather patterns resulting from climate change, increases in frequency and intensity are also expected to continue."

SEVERE THUNDERSTORM

DESCRIPTION

Severe thunderstorms are created when air masses of varying temperatures meet, and can occur singularly, in lines, or in clusters, but generally affect a small area when they occur. They can move through an area very quickly or linger for several hours. The primary damaging forces associated with these storms are straight-line winds, hail, and lightning – but they can also cause flash flooding or spawn tornadoes.

- *Straight-line winds* (including downbursts and microbursts), which in extreme cases have the potential to cause wind gusts that exceed 100 miles per hour, are capable of toppling trees, downing down power lines, and causing moderate to major property damage.
- *Hail* has the potential to cause minor to moderate property damage, particularly the larger hail stones associated with severe thunderstorms. The size of hailstones is a direct result of the size and severity of the storm.
- *Lightning* remains one of the top three storm-related killers in the United States and is a significant life/safety threat to people, but also has the potential to damage property and ignite both structure and wildland fires.

Thunderstorms can occur during any season, but are more likely to occur during the spring and early summer months of March through June. They can occur at any time of day, but are more likely to form in the late afternoon and early evening.

LOCATION

The entire planning area is uniformly susceptible to the occurrence of severe thunderstorms.

EXTENT

A thunderstorm is classified as "severe" when it contains one or more of the following damaging effects: winds gusting in excess of 50 knots (57.5 mph), hail measuring at least three-quarters of an inch in diameter, or a tornado.

PREVIOUS OCCURRENCES

Severe thunderstorms are a frequent occurrence in the planning area. NOAA historical records include 394 severe thunderstorm events in New Haven County since 1955, causing 2 fatalities, 19 injuries and approximately $2.97 million in reported property damages (2017 dollars). The majority of damages were caused by severe thunderstorm winds, though $210,000 in damage was attributed to lightning. It is believed that many additional historic events and/or losses have occurred but gone unreported or unrecorded.

Notable recent occurrences in the planning area include:

- March 2, 2017 – Strong winds caused more than $100,000 in property damages across the region. In Meriden, Route 15 was closed due to 2 cars hitting a downed tree but no casualties were reported for this event.
- February 13, 2017 – Strong winds caused more than $100,000 in property damages across the region. A wind gust up to 52mph was measured at New Haven Airport. In Branford, wires were reported down at Woodside Drive and Ark Road. In Hamden, power lines were knocked down and closed Evergreen Avenue at Cumpstone Drive.
- July 7, 2016 – Two people in West Haven received minor injuries when the tree they were taking shelter under was struck by lighning.
- February 26, 2016 – Multiple trees and power lines were reported down throughout the city of New Haven. $10,000 in property damage were reported.
- September 30, 2010 – Severe thunderstorm winds caused more than $500,000 in property damages across the region.
- June 8, 2008 – Lightning struck a pavilion at Hammonasset Beach in Madison, resulting in 1 fatality and 4 injuries.

PROBABILITY OF FUTURE EVENTS

Severe thunderstorms will continue to be a highly likely occurrence in the planning area. According to the Connecticut Hazard Mitigation Plan Update (2014), "climate change may directly increase the frequency and intensity of thunderstorms in the future."

SEVERE WINTER STORM/NOR'EASTER

DESCRIPTION

Severe winter storms can range from a moderate snowfall over a period of a few hours to blizzard conditions (sustained winds or frequent gusts of 35 miles per hour or more) with blinding wind-driven snow that lasts for several days. Heavy accumulations of snow or ice can bring down trees and power lines, disabling electric power and communications for days or weeks, and can paralyze a region by shutting down all air and rail transportation and disrupting medical and emergency services. Severe winter storms are indirectly and deceptively a significant threat to human life and safety, primarily due to automobile accidents, overexertion and exposure. The cost of snow removal, repairing damages, and loss of business can have large economic impacts on local communities.

Severe winter storms may include snow, ice, sleet, freezing rain, or a mix of these wintry forms of precipitation. Heavy accumulations of snow create hazards to transportation, as well structures with flat rooftops not engineered to withstand heavy snow loads. Sleet – raindrops that freeze into ice pellets before reaching the ground – usually bounce when hitting a surface and do not stick to objects; however, sleet can accumulate like snow and cause a hazard to motorists. Freezing rain is rain that falls onto a surface with a temperature below freezing, forming a glaze of ice. Even small accumulations of ice or freezing rain can cause a significant hazard, especially to trees and power lines. An ice storm occurs when heavy accumulations of freezing rain falls and freezes immediately upon impact. Communications and power can be disrupted for days, and even small accumulations of ice may cause extreme hazards to motorists and pedestrians.

Nor'easters are low pressure, severe storm systems that affect the Mid-Atlantic and New England States primarily during winter months. They can form over land or water and are notorious for producing heavy snow, rain, and tremendous waves that crash onto Atlantic beaches, often causing beach erosion and structural damage. Wind gusts associated with these storms can exceed hurricane force in intensity, and when combined with snow result in blizzard conditions that form deep drifts capable of paralyzing a region. Similar to hurricanes, nor'easters are capable of causing substantial damage to coastal areas due to their associated strong winds and heavy surf. A nor'easter gets its name from the continuously strong northeasterly winds blowing in from the ocean ahead of the storm.

LOCATION

The entire planning area is susceptible to the occurrence of severe winter storms and nor'easters. Coastal areas are more susceptible to the forces of strong winds, heavy surf and tidal flooding (covered under *Flood*).

EXTENT

The classification scale presented in **Table 4-14** categorizes severe winter storms/nor'easters on the eastern and central United States by intensity index category. It consists of a five-level hierarchy, with a category 1 winter storm/nor'easter being the least severe in terms of its intensity and a category 5-winter storm/nor'easter being the most severe.

Table 4-14 Classification Scale for Severe Winter Storms/Nor'easters

Intensity Index Category	Maximum Snowfall Amounts	Maximum Snowfall Rate	Potential Wind Speeds	Maximum Drifting Potential	Closings/ Delays On Communities, Schools, And Travel	Impact On Coastal And Maritime Interests	Nature Of Disruption
1	< 10 in.	Very low < 1 in./hr	Weak	Minor < 20 in.	Maybe minor (hours)	Minor	Minimal–nuisance
2	10–20+ in.	Moderate 1+ in./hr	Strong	Moderate 3 ft.	Maybe moderate (hours to a day common)	Minor to moderate	Nuisance–inconvenience
3	20–30+ in.	High 2+ in./hr	Gale Force	High 4–6+ ft.	Possibly extensive/ lengthy (several days possible)	Moderate to severe	Inconvenience–crippling

Intensity Index Category	Maximum Snowfall Amounts	Maximum Snowfall Rate	Potential Wind Speeds	Maximum Drifting Potential	Closings/ Delays On Communities, Schools, And Travel	Impact On Coastal And Maritime Interests	Nature Of Disruption
4	30–40+ in.	Very High 2-3+ in./hr	Gale-force hurricane	Very High 6–10+ ft.	Probably extensive/ lengthy (up to a week may be common)	Severe	Crippling–paralyzing
5	40–50+ in.	Overwhelming > 3+ in./hr	Gale-force hurricane	Exceptional 10–15+ ft.	Extensive/ lengthy (up to a week common)	Extreme	Paralyzing

Source: Gregory A. Zielinski, Institute for Quaternary and Climate Studies, University of Maine

NOAA utilizes additional classification systems. Until recently, the Northeast Snowfall Impact Scale (NESIS) was used by NOAA to characterize and rank high-impact northeast snowstorms. This ranking system has evolved into the currently used Regional Snowfall Index (RSI). The RSI ranks snowstorms that impact the eastern two thirds of the United States, placing them in one of five categories: Extreme, Crippling, Major, Significant, and Notable. The RSI is based on the spatial extent of the storm, the amount of snowfall, and the juxtaposition of these elements with population. RSI differs from NESIS in that it uses a more refined geographic area to define the population impact. NESIS had used the population of the entire two-thirds of the United States in evaluating impacts for all storms whereas RSI has refined population data into six regions. The result is a more region-specific analysis of a storm's impact. The use of population in evaluating impacts provides a measure of societal impact from the event.

RSI values are calculated within a GIS. The aerial distribution of snowfall and population information are combined in an equation that calculates the RSI score, which varies from around one for smaller storms to over 18 for extreme storms. The raw score is then converted into one of the five RSI categories. The largest RSI values result from storms producing heavy snowfall over large areas that include major metropolitan centers**. Table 4-15** presents the RSI categories, their corresponding RSI values, and a descriptive adjective.

Table 4-15 RSI Classification Scale for Severe Winter Storms

Category	RSI Value	Description
1	1-3	Notable
2	3-6	Significant
3	6-10	Major
4	10-18	Crippling
5	18.0+	Extreme

PREVIOUS OCCURRENCES

NOAA historical records include 28 winter storm events in the region since 1996 (including events classified as winter storm, blizzard, or ice storm), causing 2 fatalities and 4 injuries, and approximately $4 million in reported property damages (2017 dollars). It is believed that additional losses have occurred but gone unreported or unrecorded in NOAA records.

Notable recent occurrences in the planning area include:

- March 14, 2017 – Blizzard conditions were experienced through New Haven County. Trees were brought down onto power lines and approximately 3,700 power outages resulted from the strong winds and heavy snow.
- February 9, 2017 – Blizzard conditions occurred across southern Connecticut with heavy snow and strong winds. The blizzard also created delays and cancellations to the region's transportation systems as well as numerous accidents on roadways. New Haven Airport reported blizzard conditions, with visibility less than one quarter mile in heavy snow and frequent wind gusts over 35mph.
- January 27, 2015 "Winter Storm Juno" – A strong nor'easter brought heavy snow and strong winds to the Northeast. Blizzard conditions with 41 mph wind gusts were observed at the Groton - New London Airport. In the SCRCOG region, snowfall amounts ranged from 6.0 inches in Bethany to 17.0 inches in Guilford. A presidential disaster was later declared (DR-4213, declared April 8, 2015) for New Haven, New London, Tolland, and Windham counties. Over $9.6 million in Public Assistance Grants were obligated Statewide.
- February 7-8, 2013 "Winter Storm Nemo" – By February 7, 2013, this powerful winter storm had prompted winter storm warnings and winter weather advisories for the entire northeastern United States, from the Upper Midwest to New England, including the state of Connecticut. A blizzard warning was also in effect for all of Connecticut and surrounding areas and a state of emergency was declared in Connecticut on February 8. The highest amount of snowfall in the United States recorded from this storm event was 40 inches in Hamden. More than 800 National Guard soldiers and airmen were activated in Connecticut, Massachusetts, and New York to support actions needed on state roads.
- October 29-30, 2011 (Winter Storm Alfred) – A historic and unprecedented early-season winter storm impacted the area with more than one foot of heavy wet snow falling on interior portions of Southern Connecticut, while coastal areas received mainly rainfall during the event. In addition to the heavy rain and snow, strong winds were experienced along the immediate coastline. Hundreds of thousands of people across southern Connecticut lost power during this event as heavy snow accumulated on trees that still had partial to full foliage during mid-autumn. This caused extensive felling of trees and limbs across the region, which not only downed power lines but also resulted in many road closures, creating many dangerous situations of isolated residential areas with no ingress for emergency vehicles. Communications networks were also significantly disrupted (especially cellular networks). This was the first time a winter storm of this magnitude has ever occurred in October.
- January/February 2011 – A heavy snowpack after multiple snowstorms since the end of December caused multiple roof collapse events across Southern Connecticut. A barn roof collapsed in Bethany at the end of a cul-de-sac on Hunter Trail, trapping between 12 and 15 horses. Rescue operations took 3½ hours. Also in Bethany, about 13 people escaped injury when half of the roof collapsed at Fairfield County Millwork, Inc. at 20 Sargent Drive.
- January 6, 2009 (Ice Storm) – A significant amount of ice accumulated across interior portions of southern Connecticut. Numerous power lines and large tree limbs were reported down across the region.
- April 15, 2007 (Nor'easter) – A strong late season Nor'easter brought high winds that downed many trees and power lines across the region, and heavy rains that caused widespread and significant flooding across the region. FEMA reported that flood damages in Connecticut exceeded an estimated $7.1 million (2012 dollars) and more than 200 people in were forced to evacuate their residences. In New Haven County, 32 residential properties and two commercial structures were reported to have sustained major damage.

Other historic severe winter storm events for Connecticut as recorded by NOAA or as noted in the State Hazard Mitigation Plan include:

- February 11-12, 2006 (Nor'easter) – Connecticut received record snowfall in parts of the state from this storm (second largest snowfall recorded since 1906) and received a Presidential Emergency Declaration. The Governor ordered state highways shut down to help facilitate efficient snow removal by State Department of Transportation snow removal crews.
- January 22-23, 2005 (Blizzard) – Connecticut received a Presidential Emergency Declaration for this storm event. NOAA analyzed this storm and ranked it a Category 4 – Crippling event on its Northeast Snowfall Impact Scale.
- December 5-7, 2003 – Heavy snowfall amounts were recorded in parts of Connecticut including as much as twenty inches in Windham County, nineteen inches in Hartford County, and eighteen inches in Fairfield, New London, and Tolland Counties. This event received a Presidential Emergency Declaration.
- January 8-9, 1996 (Winter Storm Ginger / Blizzard of 1996) – Snowfall totals up to 27 inches recorded in Connecticut. The storm forced the State to shut down for twenty-four hours, with all roads shut except for emergency travel.
- March 12-14, 1993 (Storm of the Century) – Snowfall totals of 10-20 inches recorded across Connecticut.
- December 10-13, 1992 (Nor'easter of 1992) – Three people were killed and 26 homes were destroyed in Connecticut as a result of the storm. Tides in Long Island Sound were stacked up by the continued strong east/northeast winds reaching 55 miles per hour. This "stacking" of water resulted in the third highest tide (10.16 Feet NGVD as measured at Bridgeport, CT) ever recorded in Long Island Sound and caused more than $7.1 million in damages (2012 dollars) to over 6,000 homes. Inland areas received up to four feet of snow in northeastern Connecticut. The heavy wet snow snapped tree limbs and power lines cutting power to 50,000 homes.
- February 5, 1978 (Blizzard of 1978) – Record snowfall amounts were recorded in several areas of Connecticut. The State of Connecticut was essentially shut down for three days when the Governor ordered all roads closed except for emergency travel.
- December 18, 1973 (Ice Storm Felix) – Connecticut's most severe ice storm resulted in two fatalities and caused widespread power outages, lasting several days.
- March 11-14, 1888 (Blizzard) – The most significant blizzard to impact Connecticut also referred to as the "Great White Hurricane." Snowfall in Connecticut from this event was estimated at 45-50+ inches. Significantly high snowdrifts were created (some areas of the northeast reported up to 50 foot snow drifts) and the storm literally shut down major cities throughout the Northeast states. It is recorded that over 400 hundred people along the east coast died as a result of the blizzard. Total damages were estimated at over 492 million dollars (2012 dollars).

PROBABILITY OF FUTURE EVENTS

Severe winter storms will continue to be a highly likely occurrence in the planning area. It is anticipated that the effects of climate change will result in winters that are much shorter with fewer cold days and more precipitation, but less precipitation falling as snow and more as rain. This will result in reduced snowpack, earlier breakup of winter ice on lakes and rivers, and earlier spring snowmelt resulting in earlier peak river flows.

The Connecticut Hazard Mitigation Plan Update (2014) contains a thorough discussion of the impacts of climate change on winter storms. Due to climate change effects which will increase by mid to late century, the number of

major snow storms and snow-covered days may decrease. In general, recent climate change studies have projected a shorter winter season for Connecticut (by as much as two weeks), and less snow-covered days with a decreased overall snowpack. In addition, climate models have indicated that fewer but more intense precipitation events will occur during the winter period with more precipitation falling as rain rather than snow.

This change in winter precipitation could result in less frequent but more intense snow storms with heavier (denser) snow. NOAA's Snowfall/Meltwater Table shows that as temperatures increase the amount and weight of snowfall decreases. In addition, the increasing change in the type of winter precipitation may also decrease the number of major snow storms experienced, but increase the number of ice storms occurring. This is an important issue that requires further study as a change in snow density or changeover to more freezing rain/ice could have a large impact on managing future winter storms and the impact of such storms on the residents of Connecticut (including travel and utility services).

TORNADO

DESCRIPTION

A tornado is a violent windstorm characterized by a twisting, funnel-shaped cloud extending to the ground. Tornadoes are most often generated by strong thunderstorm activity (but may also be spawned from hurricanes and other coastal storms) when cool, dry air intersects and overrides a layer of warm, moist air forcing the warm air to rise rapidly. The damage caused by a tornado is a result of the high wind velocity and wind-blown debris, also accompanied by lightning or large hail. Most tornadoes are a few dozen yards wide and touch down only briefly, but even small short-lived tornadoes can inflict tremendous damage. Highly destructive tornadoes may carve out a path over a mile wide and several miles long.

Tornadoes often develop so rapidly that little, if any, advance warning is possible making them a significant life/safety threat to people. They are more likely to occur during the spring and early summer months of March through June and can occur at any time of day, but are more likely to form in the late afternoon and early evening. Tornadoes associated with tropical cyclones are most frequent in September and October when the incidence of tropical storm systems is greatest.

LOCATION

The entire planning area is uniformly susceptible to the occurrence of tornadoes.

EXTENT

The Enhanced Fujita Scale (EF-scale), shown in **Table 4-16**, is used to categorize the strength and magnitude of tornado events based on estimated wind speeds and related damage. This represents an update to the original Fujita Scale (F-scale) and has been implemented since February 2007.

Table 4-16 Enhanced Fujita Scale

Rating	Wind Speed (3 Second Gust)	Potential Damage
EF-0	65–85 mph	Light – Causes some damage to siding and shingles.
EF-1	86–110 mph	Moderate – Considerable roof damage. Winds can uproot trees and overturn singlewide mobile homes. Flagpoles bend.
EF-2	111–135 mph	Considerable – Most singlewide mobile homes destroyed. Permanent homes can shift off foundations.
EF-3	136–165 mph	Severe – Hardwood trees debarked. All but small portions of houses destroyed.
EF-4	166–200 mph	Devastating – Complete destruction of well - built residences, large sections of school buildings.
EF-5	Over 200 mph	Incredible – Significant structural deformation of mid- and high-rise buildings.

Source: National Oceanic and Atmospheric Administration

PREVIOUS OCCURRENCES

NOAA historical records include 16 tornado events in New Haven County since 1955, causing 1 fatality, 137 injuries and approximately $576 million in reported property damages (2017 dollars). **Map 4.2** shows the touchdown locations of previous tornado occurrences in the region as identified by NOAA (tornado track/swath data is incomplete or not available). Three of these tornado events occurred within the planning area.

Notable previous occurrences include:

- August 10, 2016 – A weak EF-0 tornado moved east across Southern New Haven County, briefly touching down just south of North Haven. Wind damage occurred on a line from about 1/4 mile west of I-91 to Quinnipiac Avenue near the Montowese section of North Haven, then east to Barberry Road. Damage was mainly limited to trees that fell onto power lines and cars with only minor structural damage. Property damage was estimated at $15,000 and no injuries or fatalities were reported.
- July 31, 2009 – An EF-1 tornado cut a narrow, discontinuous swath of damage nearly 3 miles long in Madison from near Copse Trail east-southeast to Hull Road between Acorn and Saxon Roads. Downed trees on Wellsweep Drive were strewn in multiple directions in a pattern indicative of a tornado. Snapped and uprooted hardwood trees were also indicative of maximum wind speeds around 100 mph. No fatalities or injuries were associated with this event, but it did cause an estimated $10,000 in property damages.
- July 10, 1989 – As part of a widespread outbreak, a violent F4 tornado touched down in Hamden. The damage path was five miles long and damaged or destroyed nearly 400 structures in its path, mostly in the Highwood section of town. Industrial cranes and cars were tossed through the air, and rows of houses, as well as an industrial park, were flattened. The event caused an estimated $350 million in property damages (2012 dollars) and approximately 40 injuries, but no fatalities.
- May 24, 1962 – An F3 tornado caused 1 fatality, 45 injuries, and approximately $19 million in property damages (2012 dollars) across a damage path estimated to be 11.6 miles long from near Middlebury, through Waterbury and to Southington.

PROBABILITY OF FUTURE EVENTS

Tornadoes will continue to be an occasional occurrence in the planning area. Based on historical data (Figure 4-15), the annual probability for tornado events in the planning area is estimated to be 5 percent. It is unlikely that very strong tornadoes (EF-3, EF-4 or EF-5) will strike the area though as proven by historic events it does remain possible.

The Connecticut Hazard Mitigation Plan (2014) reports that "according to NOAA, it is uncertain whether climate change will directly influence the frequency and intensity of tornadoes. However, climate change may directly increase the frequency and intensity of thunderstorms in the future. This potential future increase in thunderstorm activity will be the primary factor to affect the frequency and intensity of future tornado events. This in turn may increase the risk and occurrence of tornadoes within Connecticut. Therefore, climate change may act as an underlying influence on future tornado activity."

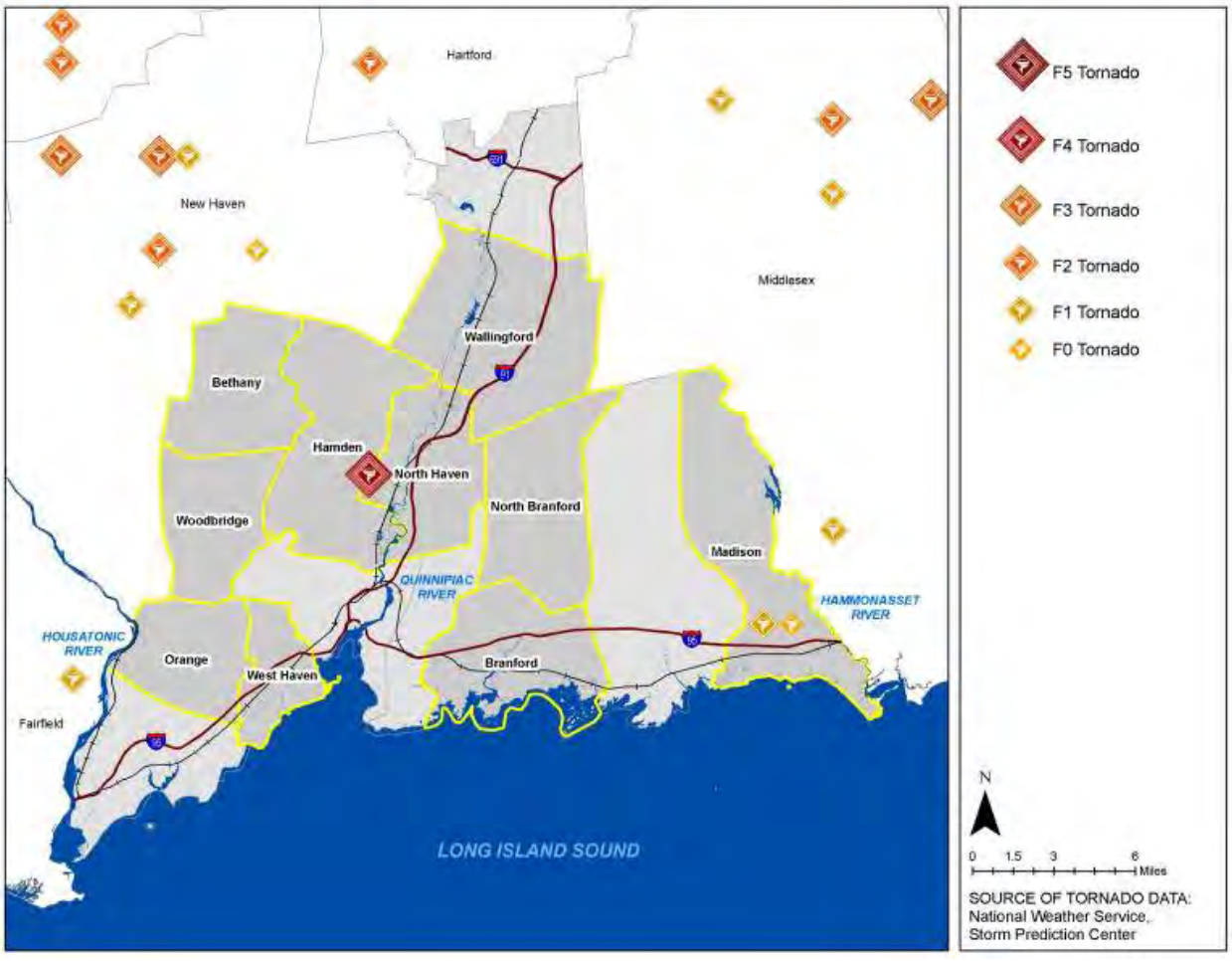


Figure 4-15 Previous Tornado Occurrences

COASTAL EROSION

DESCRIPTION

Coastal erosion may be generally defined as a gradual, chronic but natural condition of losing shoreline sediments (mostly beach sand and dune systems) due to wind, waves, tides, currents, and other natural coastal processes. Other long-term influences may include subsidence and sea level rise. Rapid coastal erosion exacerbates the long-term threat posed by gradual chronic erosion, and typically results from episodic natural hazard events such as hurricanes, nor'easters, and storm surge. Such events have the ability to flatten dunes and create massive erosion in only hours or days. Erosion may also be worsened by human activities such as boat wakes, shoreline hardening, and offshore dredging.

As coastal erosion continues the shoreline moves landward, posing an increased threat of damages to adjacent property and infrastructure. Natural recovery from episodic erosion events can take months or years. If a beach and dune system does not recover quickly enough naturally, coastal and upland property may be exposed to further damage in subsequent events. Shoreline hardening techniques such as seawalls, revetments, bulkheads, groins and jetties may temporarily stave off coastal erosion, but in most cases they worsen existing erosion or cause new erosion in adjacent areas.

LOCATION

The areas along all seven shoreline towns (Milford, West Haven, New Haven, East Haven, Branford, Guilford, and Madison) with direct exposure to Long Island Sound are susceptible to the occurrence of long-term and storm-induced coastal erosion. The previous edition of this plan noted that although some information on areas of coastal erosion existed, formal compilation of this data and a spatial, graphic representation of erosion hazard areas had not been developed for the Connecticut shoreline. However, since then, the State published the report and associated GIS mapping "Analysis of Shoreline Change in Connecticut: 100+ Years of Erosion and Accretion" (July 2014, Connecticut Department of Energy & Environmental Protection (DEEP), the Connecticut Sea Grant (CT Sea Grant) and the University of Connecticut Center for Land Use Education and Research (UCONN-CLEAR)).

According to the Connecticut Department of Energy and Environmental Protection (CT DEEP), erosion in beach areas along the north-south trending shoreline from Milford to New Haven (including West Haven) has traditionally been a concern, and has been aggravated by extensive stabilization of sediment sources in headland areas. Most of the shoreline between New Haven and Guilford (including Branford) is deemed stable, though there are local areas of concern. From Guilford to Old Lyme (including Madison), erosion of beaches and low bluffs is common. In many areas, structural erosion control efforts such as groins and seawalls have altered natural shoreline processes and have aggravated the problem by trapping natural sediment needed for beach replenishment. In other areas, including Madison's Hammonasset Beach, sand replenishment has been used to slow the progress of coastal erosion.

Coastal resilience plans have been developed and published for Guilford (2014), Branford (2016), Madison (2016), Milford (2016), and West Haven (2017); only New Haven and East Haven have not developed such plans. However, all seven shoreline municipalities participated in the Regional Framework for Coastal Resilience in

Southern Connecticut (2015-2017). Through these efforts, detailed mapping and descriptions of erosion areas in all seven municipalities have been developed.

EXTENT

Coastal erosion is measured as the rate of change in the position or horizontal displacement of a shoreline over a period of time, measured in units of feet or meters per year. There is no universal scientific scale or index used to classify the magnitude or severity of coastal erosion based on these rates. The report referenced above, "Analysis of Shoreline Change in Connecticut: 100+ Years of Erosion and Accretion," utilizes lateral distance per unit time to characterize erosion. These rates are calculated and presented using multiple statistical methods, including:

- End Point Rate (EPR): net shoreline movement divided by the time elapsed between the oldest and the most recent shoreline.
- Linear Regression Rate (LRR): determined by fitting a least-squares regression line to all shoreline points for a particular transect. This rate uses all data, regardless of changes in trend or accuracy over time, and is based on accepted statistical concepts. Tends to underestimate the rate of change relative to EPR.

PREVIOUS OCCURRENCES

According to a recent USGS report the average rate of long-term shoreline change for the New England coast was -0.5 meters per year with an uncertainty in the long-term trend of ±0.09 meters per year.[165] However the actual rates of erosion vary substantially along the coast as a function of shoreline type and are influenced primarily by episodic events.

Connecticut's shoreline change report provides very detailed erosion figures for each one of hundreds of segments of the shoreline. The report provides a town-by-town summary; erosion end-point rates (EPR) for SCRCOG municipalities are summarized in **Table 4-17.**

Table 4-17 Erosion End-Point Rates for SCRCOG Communities

Short Term Change (1983-2006)		Long Term Change (c. 1880-2006)	
Town	EPR Ave (m/yr)	Town	EPR Ave (m/yr)
Milford B	0.81	Milford B	0.16
Milford B & C	0.38	Milford B & C	0.06
Milford C	0	Milford C	-0.04
West Haven	-0.24	West Haven	0.03
New Haven C	N/A	New Haven C	0.03
New Haven C & D	0.02	New Haven C & D	0.1
New Haven D	0.02	New Haven D	0.1

[165] Hapke, C.J., Himmelstoss, E.A., Kratzmann, M., List, J.H., and Thieler, E.R., 2010, National assessment of shoreline change; historical shoreline change along the New England and Mid-Atlantic coasts: U.S. Geological Survey Open-File Report 2010-1118.

Short Term Change (1983-2006)		Long Term Change (c. 1880-2006)	
Town	EPR Ave (m/yr)	Town	EPR Ave (m/yr)
East Haven	0.05	East Haven	0.05
Branford	0.04	Branford	0.01
Guilford D	0.23	Guilford D	-0.02
Guilford D & E	0.24	Guilford D & E	-0.07
Guilford E	0.35	Guilford E	-0.35
Madison	-0.17	Madison	-0.07

The most significant episodic erosion events for the planning area have been associated with large coastal storms including hurricanes, tropical storms and nor'easters (covered under *Hurricane/Tropical Storm* and *Severe Winter Storm/Nor'easter*). The most recent events include Hurricane Sandy (October 2012) and Tropical Storm Irene (August 2011). These events contributed to the rapid erosion of primary frontal dune systems, damage to seawalls and revetments, and the loss of other protective features along the immediate shoreline, which as a result significantly increases the risk of property damages to future coastal flooding events.

PROBABILITY OF FUTURE EVENTS

Coastal erosion will continue to be a highly likely occurrence along many shoreline areas of the planning area. This includes both the continuous but slow onset, long-term effects of natural coastal processes as well as rapid, episodic erosion caused by large coastal storms. It is anticipated that the effects of climate change, including sea level rise, will result in an increase in the extent of coastal erosion.

DAM FAILURE

DESCRIPTION

Dam failure is the collapse, breach or other failure of a dam structure that results in an uncontrolled release of impounded water causing downstream flooding. Dam failures can result from natural events, human-induced events, or a combination. Failures due to natural events such as prolonged periods of rainfall and flooding can result in overtopping (the most common cause), though "dry day" failures caused by earthquakes or other unforeseen events are particularly hazardous because there is generally little to no advance warning. Human-induced failures may be attributed to improper design, improper maintenance, or negligent operation and typically include inadequate spillway capacity resulting in overtopping, or internal erosion caused by embankment or foundation leakage (piping). Complete failure occurs if internal erosion or overtopping results in a complete structural breach, releasing a high-velocity wall of debris-laden water that rushes downstream, damaging or destroying everything in its path.

LOCATION

According to CT DEEP, there are 220 state-regulated dams within the South Central Region, and an additional 59 dams that are upstream of the region along the Quinnipiac River and its tributaries. Hundreds of additional dams are located in the Housatonic River drainage basin, and therefore located upstream of the western boundaries of

Orange and Milford. Of the dams located within the South Central Region, 27 are classified as having high hazard potential (Class C) and 30 are classified as having a significant hazard potential (Class B). A description of each hazard class as defined by the State is provided below, under *Extent*.

Individual maps later in this chapter show the location of all state-regulated dams in the South Central Region according to their assigned hazard class. **Table 4-18** lists the number of these dams for each municipal jurisdiction in the region by hazard class.

Table 4-18 State-Regulated Dams in South Central Region, by Hazard Class

Jurisdiction	Hazard Class					
	High (C)	Significant (B)	Moderate (BB)	Low (A)	Negligible (AA)	Total
Bethany	2	3	3	13	0	21
Branford	1	4	0	3	0	8
East Haven	1	0	1	4	0	6
Guilford	2	2	9	8	0	21
Hamden	5	3	6	7	0	21
Madison	1	1	5	10	0	17
Meriden	3	3	4	2	0	12
Milford	0	2	6	7	0	15
New Haven	0	1	0	2	0	3
North Branford	1	1	1	5	1	9
North Haven	0	5	0	8	0	13
Orange	0	0	3	9	0	12
Wallingford	4	3	2	24	0	33
West Haven	4	2	1	2	0	9
Woodbridge	3	0	0	18	0	21
Total	**27**	**30**	**41**	**122**	**1**	**221**

Source: State of Connecticut, Department of Energy and Environmental Protection

EXTENT

Two factors influence the potential severity of a dam failure: the amount of water impounded, and the density, type, and value of development and infrastructure located downstream. The potential extent of dam failure may be classified according to their "hazard potential," meaning the probable damage that would occur *if* the structure failed, in terms of loss of human life and economic loss or environmental damage. The State of Connecticut classifies dam structures under its regulations according to hazard potential as described in **Table 4-19.** It is important to note that these classifications are not based on the adequacy or structural integrity of existing dam structures.

Table 4-19 Classification of Hazard Potential for Connecticut Dams

Class	Hazard Potential	Description of Impacts *(if dam were to fail)*
AA	Negligible	No measurable damage to roadways; no measurable damage to land and structures; negligible economic loss.
A	Low	Damage to agricultural land; damage to unimproved roadways; minimal economic loss.
BB	Moderate	Damage to normally unoccupied storage structures; damage to low volume roadways; moderate economic loss.
B	Significant	Possible loss of life; minor damage to habitable structures, residences, hospitals, convalescent homes, schools, etc.; damage to or interruption of the use of service of utilities; damage to primary roadways and railroads; significant economic loss.
C	High	Probable loss of life; major damage to habitable structures, residences, hospitals, convalescent homes, schools, etc.; damage to main highways; great economic loss.

Source: State of Connecticut, Department of Energy and Environmental Protection

PREVIOUS OCCURRENCES

There is no record of any damages, fatalities or injuries associated with dam failure in the planning area. According to the National Performance of Dams Program (NPDP) Inventory at Stanford University and a review of data made available by the Association of State Dam Safety Officials (ASDSO), there has been only one report of a dam failure event in the planning area.

On April 16, 2007 the Disbrow Pond dam in Bethany failed when the embankment failed near the inlet structure. The breach was approximately 12 feet high and 15 feet wide but resulted in no damages. The dam, which was designed by the Natural Resource Conservation Service, is classified as a low hazard dam (Class A).

There have been many significant dam failures across Connecticut, mainly caused by major flood events, which resulted in human casualties and millions of dollars in property damage. However according to CT DEEP all of these dam failures occurred outside of the planning area.

PROBABILITY OF FUTURE EVENTS

Dam failure remains an unlikely occurrence for all state-regulated dams. The CT DEEP's Dam Safety Section is tasked with monitoring the routine inspection and maintenance of those dams that present the greatest risk or are in need of structural repair. Dam owners are responsible for complying with maintenance and repair requirements, and developing emergency action plans.

State regulations require that over 600 dams in Connecticut be inspected annually and prioritizes inspections of those dams which pose the greatest potential threat to downstream persons and properties. Other structures are inspected as time and funding permit, and upon notification of potentially significant deficiencies or emergency conditions. Regulated dams must be designed to pass the 100-year rainfall event with one foot of freeboard, an additional factor of safety against overtopping. The most critical and hazardous dams are required to meet a

spillway design standard much higher than passing the runoff from a 100-year rainfall event. As more dams get repaired in the future, the number of those that do not meet these minimum requirements decreases.

It is anticipated that the effects of climate change will not increase the probability of future dam failure events, though projections for increased heavy rainfall events should continue to be considered in the regulation of dam repair and/or construction.

DROUGHT

DESCRIPTION

Drought is defined as a period of abnormally dry weather sufficiently prolonged for the lack of water to cause serious hydrologic imbalance in the affected area. Drought is a natural climatic condition caused by an extended period of limited rainfall beyond that which occurs naturally in a broad geographic area. High temperatures, high winds and low humidity can worsen drought conditions, and can make areas more susceptible to wildfire. Human demands and actions can also hasten drought-related impacts.

Droughts are frequently classified as one of following four types: meteorological, agricultural, hydrological or socio-economic. Meteorological droughts are typically defined by the level of "dryness" when compared to an average, or normal amount of precipitation over a given period of time. Agricultural droughts relate common characteristics of drought to their specific agricultural-related impacts. Hydrological drought is directly related to the effect of precipitation shortfalls on surface and groundwater supplies. Human factors, particularly changes in land use, can alter the hydrologic characteristics of a basin. Socio-economic drought is the result of water shortages that limit the ability to supply water-dependent products in the marketplace.

LOCATION

The entire planning area is susceptible to the occurrence of droughts, though coastal areas may be considered somewhat less susceptible based on historical records.

EXTENT

The Palmer Drought Severity Index (PDSI), shown in **Table 4-20**, measures the difference between water supply (precipitation and soil moisture) and water demand (amount needed to replenish soil moisture and keep larger bodies of water at normal levels). It primarily reflects long-term drought and has been used extensively to initiate drought relief.

Table 4-20 Palmer Drought Severity Index

PDSI Value	Classification
+4.0 or above	Extremely Moist
+3.0 to +3.9	Very Moist Spell
+2.0 to +2.9	Unusual Moist Spell
-1.9 to +1.9	Near Normal
-2.0 to -2.9	Moderate Drought
-3.0 to -3.9	Severe Drought
-4.0 or less	Extreme Drought

Source: National Oceanic and Atmospheric Administration

PREVIOUS OCCURRENCES

NOAA historical records indicate that there have been 22 periods of severe to extreme droughts in the region since 1895, as listed in **Table 4-21.** These records also indicate that severe to extreme drought conditions were experienced by inland areas 8.5 percent of the time and coastal areas 6.2 percent of the time.

Table 4-21 Periods of Severe or Extreme Drought in South Central Region, 1895-2018

Drought Period	Duration	Lowest PDSI Value
1/1901 – 2/1901	2 months	-3.97 in 2/1901
11/1909 – 12/1909	2 months	-3.28 in 12/1909
4/1910 – 9/1911	18 months	-5.20 in 5/1911
9/1912 – 2/1913	6 months	-3.66 in 11/1912
7/1913 – 9/1913	3 months	-3.97 in 8/1913
9/1914 – 12/1914	4 months	-3.62 in 11/1914
4/1915 – 6/1915	3 months	-3.98 in 6/1915
11/1924 – 6/1925	8 months	-4.01 in 4/1925
11/1929 – 4/1931	18 months	-4.77 in 9/1930
10/1931 – 2/1932	5 months	-4.35 in 12/1931
4/1932 –7/1932	4 months	-3.41 in 5/1932
11/1949 – 1/1950	3 months	-3.52 in 12/1949
7/1957 – 11/1957	5 months	-3.68 in 9/1957
9/1964 – 1/1965	5 months	-4.16 in 11/1964
3/1965 – 2/1967	24 months	-5.19 in 12/1965
3/1985 – 4/1985	2 months	-3.84 in 4/1985
8/1995 – 9/1995	2 months	-3.61 in 8/1995
7/1999 – 8/1999	2 months	-3.50 in 7/1999
1/2002 – 4/2002	4 months	-3.67 in 2/2002
4/2013 – 5/2013	2 Months	-3.19 in 4/2013
4/2015 – 5/2017	25 Months	-4.77 in 9/2016
9/2017	1 Month	-3.16 in 9/2017

Sources: Northeast Regional Climate Center, Cornell University; and NOAA National Climatic Data Center

The impact of previous droughts on local communities vary widely, though most are related to social, economic and environmental concerns rather than direct threats to life and property. Past events in the South Central Region have resulted in some costly impacts associated with the drying of residential wells in rural areas, though these impacts have not been widespread. The drought of 2015-2016 required some water utilities in the South Central Region to make changes to water management, but financial losses were not experienced in the region (public water supply emergencies were approved by the State in Danbury, Waterbury, and Aquarion Water Company's southwestern towns – all west of the South Central Region). It is also worth noting that previous periods of severe to extreme drought conditions have led to increased numbers and sizes of wildfires across the region (covered under *Wildfire*).

PROBABILITY OF FUTURE EVENTS

Drought will continue to be an occasional occurrence in the planning area. It is anticipated that the effects of climate change will result in an increase in the frequency, duration and intensity of droughts. By late this century, under a higher emissions scenario, short-term (one to three month) droughts are projected to occur as frequently as once each summer.

The Connecticut Hazard Mitigation Plan (2014) states that "recent climate change studies have indicated that although precipitation is projected to increase throughout this century, it will be in the form of short duration, intense, and less frequent events… Furthermore, it is projected that the frequency and intensity of both long-term and short-term droughts in Connecticut, and throughout the Northeast, will increase throughout the century with the impacts beginning to occur with a greater degree of frequency beginning in the mid-century."

The State Water Plan (2018) includes a relatively detailed narrative regarding droughts. The plan notes that "typical climate forecasts tend to suggest that increased temperatures coupled with increased annual precipitation generally correspond to *higher intensity storms* (greater flood risk) and longer dry periods in the summer months (more frequent and/or intense droughts). Because Connecticut has so many small reservoir systems, these systems could be very sensitive to such changes…" The State Water Plan also notes that "the *distribution* of rainfall may change significantly (more rain in winter, less rain in summer), causing more frequent dry periods during the warmer months, where the impacts of drought can be exacerbated by increasing temperatures and resulting evaporative losses from water bodies and soil moisture."

FLOOD

DESCRIPTION

Flooding is the most frequent and costly natural hazard in the United States (and in Connecticut). Nearly 90-percent of presidential disaster declarations result from natural events where flooding was a major cause of human casualties and property damages.

Flooding may be generally defined as the partial or complete inundation of normally dry land by the overflow and accumulation of excess water. Flooding may classified according to three distinct hazard types:

- *Riverine floods* include overbank flooding from a river or stream channel onto adjacent floodplains, and are generally caused by excessive precipitation from large-scale weather systems. A rapid accumulation of heavy localized downpours may also impact smaller streams and creeks to cause *flash floods*, characterized by a rapid rise in water level and/or high velocity flow with little warning. Other potential causes of riverine floods include ice jams or dam failures.
- *Coastal floods* occur along the shorelines of large water bodies and are caused by the wind-driven waves, storm surge and heavy rainfall produced by hurricanes, tropical storms, nor'easters and other large, low-pressure coastal storms with cyclonic flows. Coastal flood hazards are often exacerbated over the long term by coastal erosion and sea level rise.
- *Urban floods* occur where the physical development of a community has decreased the ability of natural groundcover to absorb and retain surface water runoff, and existing drainage systems are incapable of conveying or retaining storm water flow. They are most often caused by isolated, high-intensity rainfall events of relatively short duration (1 to 3 hours). Even when drainage systems are designed to acceptable standards, urban flooding may occur when they are obstructed by debris, sediment or other materials that limit their functional capacity.

LOCATION

Riverine Flood

Most of the South Central Region is located in the South Central Coast River Basin, with some western portions of Bethany Woodbridge and Orange in the Housatonic River Basin, and very small portions of Wallingford, North Branford, and Madison in the Connecticut River Basin.

Several major rivers flow through planning area, including the Quinnipiac, Housatonic and Hammonasset. The Housatonic River flows southeasterly and defines a portion of the western municipal boundary for Orange. The Quinnipiac River flows south through Wallingford, North Haven, and Hamden before continuing through New Haven to New Haven Harbor, an inlet of Long Island Sound. The Hammonasset River flows south and defines the eastern municipal boundary for Madison, emptying into Long Island Sound just east of Hammonasset State Park. In addition to these major rivers, there are a large number of smaller rivers and tributaries, streams, lakes and other water bodies throughout the region that are associated with special flood hazard areas as delineated by FEMA.

The locations of all special flood hazards areas for the South Central Region are depicted in maps for each jurisdiction later in this chapter, reflecting the current FEMA Digital Flood Insurance Rate Maps (DFIRMs)[166]. Jurisdiction-specific maps provided in the *Risk Analysis* show the locations of these special flood hazard areas for each participating jurisdiction. Descriptions for these special flood hazard areas are provided in the *Extent* portion of this section.

[166] Current effective date for FEMA's Digital Flood Insurance Rate Maps (DFIRMs) for New Haven County is 5/16/2017.

Coastal Flood

Coastal special flood hazard areas as currently mapped on FEMA DFIRMs are included in the map figures listed above for riverine flood. This includes "VE Zones" which are defined as areas subject to inundation by the 1 percent annual chance flood event with additional hazards due to storm-induced velocity wave action.

The location of storm surge inundation areas for the South Central Region are depicted in maps for applicable municipalities (Milford, West Haven, Orange, New Haven, Hamden, North Haven, East Haven, Branford, Guilford, and Madison) later in this chapter. These maps illustrate areas that could be inundated by "worst case" scenarios associated with Category 1 through 4 hurricanes striking the coast of Connecticut.

Urban Flood

Urban floods often strike rapidly, terminate quickly, and occur in areas generally not considered at risk to major flooding (including areas outside of mapped floodplains). The primary areas of concern with regard to urban flooding for each participating jurisdiction are well known to local officials, and are often attributed to inadequate drainage of impervious surfaces. The localized areas of most critical concern, as identified by jurisdictions, are included in the Problem Statement tables provided in the *Risk Analysis* section.

EXTENT

Riverine Flood

The severity of a riverine flood event is typically determined by a combination of several major factors, including: stream and river basin topography and physiography; precipitation and weather patterns; recent soil moisture conditions; the degree of vegetative clearing; and impervious surface.

The periodic flooding of lands adjacent to rivers, streams and shorelines (floodplains) is a natural and inevitable occurrence that can be expected to take place based upon established recurrence intervals. The recurrence interval of a flood is typically defined as the average time interval, in years, expected between a flood event of a particular magnitude and an equal or larger flood. Flood magnitude (spatial extent and depths) increases with increasing recurrence interval.

Floodplain areas are delineated according to the frequency of the flood that is large enough to cover them. For example, the 10-year floodplain will be covered by the 10-year flood and the 100-year floodplain by the 100-year flood. A more appropriate way of expressing flood frequency is the percent chance of occurrence in any given year (annual probability). For example, the 100-year flood has a 1 percent chance of occurring in any given year, and the 500-year flood has a 0.2 percent chance of occurring in any given year. Statistically, the 1 percent annual chance flood has a 26 percent chance of occurring during a 30-year period of time, which is equal to the duration of many home mortgages. Contrary to what the term suggests, a "100-year flood" is not a flood that occurs only once every 100 years. A "100-year flood" can and often does occur multiple times in a century.

Special flood hazard areas identified on FEMA DFIRMs (as shown in the map figures for riverine flood) are defined as the areas that will be inundated by the flood event having a 1 percent chance of being equaled or exceeded in any given year. The 1 percent annual chance flood is also referred to as the base flood, and is the national

minimum standard for applying FEMA's NFIP floodplain management regulations and mandatory flood insurance purchase requirements. Areas shown to be inundated by the 0.2 percent annual chance are considered moderate flood hazard areas, and areas outside of these areas are considered minimal flood hazard areas.

Coastal Flood

The intensity and duration (or forward speed) of a storm is the most influential factor affecting the severity and impact of storm surges. While hurricanes and tropical storms often move through areas relatively quickly, nor'easters can last for days and multiple tidal cycles – often causing major coastal flooding, erosion and damage from wind-driven wave action.

Special flood hazard areas identified as "VE Zones" on FEMA DFIRMs (as shown in the map figures for riverine flood) are defined as areas subject to inundation by the 1 percent annual chance flood event with additional hazards due to storm-induced velocity wave action. Mandatory flood insurance purchase requirements and floodplain management standards apply for these areas.

Urban Flood

The severity of urban flooding varies greatly and is highly dependent on rainfall intensity and duration, but is generally limited to minimal, localized damages and/or temporary disruptions to transportation infrastructure. However the lack of warning associated with urban flood events often creates significant threats to public safety due to flooded roadways, and results in increased damage to property that could have been prevented with more advance notice (particularly for vehicles left unattended in areas susceptible to urban flooding).

PREVIOUS OCCURRENCES

NOAA historical records include 121 flood events in the region since 1996, causing 3 fatalities, no injuries and more than $4.2 million in reported property damages (2017 dollars). The majority of these events may be classified as urban or flash floods, with significant street flooding that make roads impassable, submerge parked vehicles, and result in serious life safety threats to drivers. These flood events also often isolate people in localized areas with access restricted by low-lying roadways. However, the damage figures associated with these events are believed to greatly underestimate the value of actual flood losses that have occurred but gone unreported or unrecorded in NOAA records. This includes some of the more recent major coastal flood events associated with hurricanes and tropical storm events, which are covered in more detail under *Hurricane/Tropical Storm*.

FEMA historical records include a total of over $157 million in insured damages for participating jurisdictions as recorded through the National Flood Insurance Program (NFIP) since the late 1970s. The average claims payment per flood loss is approximately $18,500. **Table 4-22** lists the number of insured losses and total claims payments for historical flood damages in each jurisdiction as recorded under the NFIP as of January 31, 2018. It should be noted that this information only reflects previous losses as reported through claims under the NFIP, and that additional uninsured or unreported losses have occurred throughout the region.

Table 4-22 NFIP Statistics on Flood Losses and Claims Payments (as of January 31, 2018)

Jurisdiction	NFIP Entry Date	Total Flood Losses	Total Claims Payments
Bethany	08/23/1977	3	$7,226
Branford	12/15/1977	736	$12,465,423
East Haven	02/01/1978	1,631	$33,479,477
Guilford	05/01/1978	421	$7,504,557
Hamden	06/15/1979	537	$3,335,994
Madison	09/15/1978	578	$11,270,942
Milford	12/6/1971	3,150	$75,241,413
New Haven	07/16/1980	422	$5,043,909
North Branford	07/03/1978	70	$457,504
North Haven	09/17/1980	153	$1,549,357
Orange	03/18/1980	133	$1,262,028
Wallingford	09/15/1978	127	$900,437
West Haven	01/17/1979	498	$4,841,463
Woodbridge	03/16/1981	69	$509,909
	Total	**8,523**	**$157,435,348**

Source: Federal Emergency Management Agency

Notable recent occurrences in the planning area include:

- October 29-30, 2012 – The storm surge and tidal flooding associated with Hurricane Sandy (covered under *Hurricane/Tropical Storm*) resulted in major flood damage and erosion along the Connecticut shoreline. According to FEMA estimates for New Haven County, the storm caused minor damage to 342 structures, major damage to 150 structures, and destroyed 4 structures. It is estimated that storm surge inundation impacted hundreds of roadways, 3 schools, 1 fire station, 34 electrical facilities, 1 waste water facility, and 65 communication facilities throughout the county. As of January 9, 2013 more than 1,453 people had applied to FEMA for Individual Assistance for more than $9 million in losses.
- August 28, 2011 – The large envelope of winds associated with Tropical Storm Irene pushed a 3 to 8 foot storm surge into Long Island Sound resulting in moderate to major coastal flooding, wave damage and erosion. This resulted in damage or destruction of over 100 homes along the Connecticut shoreline, though the majority of these were in neighboring jurisdictions outside of the planning area. Heavy damage to public beaches and other public and private facilities also occurred. In West Haven, heavy damage was sustained to several coastal properties in Savin Rock. In Branford, several feet of water inundated Linden Avenue and neighboring properties. This combined with wave action caused severe erosion and undermining of roadways in the area with about a dozen homes and businesses significantly damaged. Along Seaview Avenue several homes were flooded and damaged with up to 6 feet of surge.
- July 8, 2011 – The combination of an approaching upper level disturbance and a stationary front in the vicinity produced thunderstorms with very heavy rainfall that caused flash flooding in Middlesex and New Haven Counties, and more than $1 million in estimated property damages.
- March 7, 2011 – Heavy rains and melting snow from an unnamed winter storm caused the Housatonic River to swell more than two feet above flood stage. Several vehicles and approximately 20 homes in New Haven County were damaged.

- March 31, 2010 – A Nor'easter centered off the Delmarva coast produced an extended period of heavy rainfall across the area as it tracked very slowly to the northeast. This caused widespread flooding across portions of Southern Connecticut and more than $100,000 in estimated property damages.
- May 27, 2008 – Strong thunderstorms in advance of a cold front crossed the tri-state area producing isolated flash flooding in New Haven County and more than $600,000 in estimated property damages.
- April 15, 2007 – A strong late season Nor'easter impacted the region with a period of heavy rain that caused widespread and significant river, stream, and urban flooding of low lying and poor drainage areas. The storm also produced moderate tidal flooding across portions of Long Island Sound. This storm resulted in considerable damage to property.
- April 16, 1996 – Flash flooding across New Haven County caused more than $2.2 million in estimated property damages (2012 dollars).

According to FEMA's Flood Insurance Study (FIS), the most notable and serious riverine floods in the region occurred in 1815, 1893, 1927, March 1936, January and September 1938, January 1949, August and October 1955, January 1978, June 1982, March and April 1987, and June 1992. Riverine floods have occurred in every season of the year, with some of the most severe floods occurring in early spring as a result of snow melt and heavy rains. Late summer and autumn are another critical season for flood danger due to heavy rainfall and the possibility of hurricanes and tropical storms. Winter floods result from occasional thaws, particularly in years of heavy snowfall.

The most severe coastal flooding in the region has occurred as a result of high tides and storm surge caused hurricanes, tropical storms and nor'easters (covered under *Hurricane/Tropical Storm* and *Severe Winter Storm/Nor'easter*). The region was heavily impacted by storm surge from hurricanes in 1938 and 1954. The storm surge accompanying these storms represented a recurrence interval ranging from 22 to 50 years. In more recent years, the region has suffered damaging storm surges and tidal flooding from Tropical Storm Irene (2011) and Hurricane Sandy (2012), as described earlier in this section.

Some of the historic major flood events impacting the region as noted in the FIS and the State Hazard Mitigation Plan include:

- June 1982 – The South Central Region was especially hard hit during the 1982 floods across Connecticut, caused by a large low-pressure system that produced prolonged and heavy rainfall over several days following a prior week of rainfall that had saturated the ground. Flooding in the south central portion of New Haven County was estimated to greater than a 200-year recurrence interval. Streams that experienced the most severe flooding were the Wepawaug River (Lower Reach) in Orange and Milford, and the Mill River in Hamden. Very little flooding of large rivers occurred during this event. In total more $662 million in damages (2012 dollars) and 11 fatalities were recorded across Connecticut as a result of the 1982 floods. More than 15,000 homes were damaged (mostly by minor flooding), with 1,500 homes considered moderately damaged and 37 homes destroyed. In addition, more than 400 commercial and industrial properties were damaged, and many state and local roads, bridges, dams, and utility infrastructure also suffered damages.
- August 1955 – The greatest flood of record within the Housatonic and Naugatuck River watersheds occurred in August 1955 when two tropical storms, Connie and Diane, produced heavy precipitation across saturated soils within one week of each other. Severe flooding occurred across Connecticut as a result of these back-to-back storms, causing more than 100 fatalities and more than $4.3 billion in

estimated property damage (2012 dollars) across Connecticut. It is estimated that the August 1955 peak flood discharge has a return frequency of about 110 years on the Housatonic River.

- March 1936 – The "Great Connecticut River Flood" of March 1936 was the result of a combination of melting snow and moderately heavy rains over a 13-day period. The Housatonic River was one of three major rivers affected with record flood heights. The floodwaters left an estimated 14,000 people homeless and several people died as a result of this event. The flood resulted in an estimated $333 million in property damage (2012 dollars) across Connecticut.

PROBABILITY OF FUTURE EVENTS

Floods of varying extent will continue to occur in the planning area. Riverine floods will continue to be an occasional occurrence in planning area, while coastal and urban floods will likely occur more frequently. It is anticipated that the effects of climate change, including sea level rise, will result in an increase in the extent and frequency of storm surge and coastal flooding. Severe urban flooding due to more precipitation and heavy downpours is also likely to occur more frequently.

The Connecticut Hazard Mitigation Plan Update (2014) notes that "Connecticut will continue to be at risk for flood events due to the geographic location along the Northeast Atlantic seaboard, abundance of waterways, and future projections by climate change models and studies that project an increase in more intense precipitation events punctuated by periods of drought conditions. Published climate change studies discuss an increase in extreme precipitation frequency, and an actual change in precipitation types and intensity throughout the next century."

The State Water Plan (2018) includes an analysis associated with four scenarios (warm/wet, warm/dry, hot/wet, and hot/dry) and notes that "Precipitation projections are more variable, although consistently projecting a generally wetter future for all four scenarios. The largest precipitation increases are projected for the wetter months (higher percentiles), including extreme wet months. It follows, then, that the seasonality plots show that winter and spring precipitation changes are projected to be larger than summer and autumn changes. Drier months are generally projected to remain about the same in terms of both frequency and rainfall level." The State Water Plan further notes that "The largest increases in streamflow are generally projected for the winter months (Dec - Feb), for all four climate ensembles. This is likely attributable to a combination of both greater winter precipitation and reduced snow accumulation."

SEA LEVEL RISE

DESCRIPTION

Sea level rise refers to an increase in mean sea level over time. There is strong scientific evidence that global sea level is now rising at an increased rate and will continue to rise during this century.

The major causes of **global sea level rise** are thermal expansion caused by the warming of the oceans (since water expands as it warms) and the loss of land-based ice (such as glaciers and polar ice caps) due to increased melting.

Local sea level change, 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 local 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 and property and infrastructure become more exposed to the frequency and severity of coastal flood and storm surge inundation.

Global Mean Sea Level is projected to rise between 0.98 and 8.2 feet over this century.

LOCATION

Maps were prepared to show potential sea level rise inundation areas for the South Central Region based on the Connecticut Institute for Resilience and Climate Adaptation (CIRCA) "planning threshold" of a 0.5-meter (1.64 feet) rise in sea level, expected by 2050. CIRCA has also defined a "Caution Threshold" of 1.0 meters (3.28 feet) in sea level rise expected by the 2090s, or as soon as 2060; Connecticut sea level rise projections are described in detail later in this section. The figure is based on the "high" estimate of projected mean higher water inundation in the year 2080 due to sea level rise (not inclusive of any storm surge scenario) as mapped by The Nature Conservancy.

EXTENT

The sea level rise hazard is a slow onset hazard, and its severity or magnitude is measurable only over long periods of time as further described below. "Nuisance flooding" refers to the inundation of low-lying areas under "blue sky," non-storm conditions; this phenomenon has already 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.

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.

PREVIOUS OCCURRENCES

According to the NOAA, while studies show that sea levels changed little from AD 0 until 1900, sea levels began to climb in the 20th century. Records and research show that global sea level has been steadily rising at a rate of 1 to 2.5 millimeters (0.04 to 0.1 inches) per year since 1900, and this rate may be increasing. Since 1992, new methods of satellite altimetry indicate a rate of rise of 3 millimeters (0.12 inches) per year.

Two long-term tide gauges are operated by the National Oceanic and Atmospheric Administration (NOAA) along the Connecticut coastline as demonstrated in **Figure 4-16.** Data collected by these gauges are available online at tidesandcurrents.noaa.gov.

The Bridgeport gauge, located at Steel Point, has been operating since 1964. The historic mean sea level trend at that gauge has been a rise of 2.83 millimeters per year (0.93 feet in 100 years) with a 95% confidence interval of plus-or-minus 0.44 millimeters per year, based on monthly mean sea level data from 1964 to 2016.

The New London gauge, located in the mouth of the Thames River, has been operating since 1938. The historic mean sea level trend at that gauge has been a rise of 2.57 millimeters per year (0.84 feet in 100 years) with a 95% confidence interval of plus-or-minus 0.22 mm/year, based on monthly mean sea level data from 1938 to 2016.

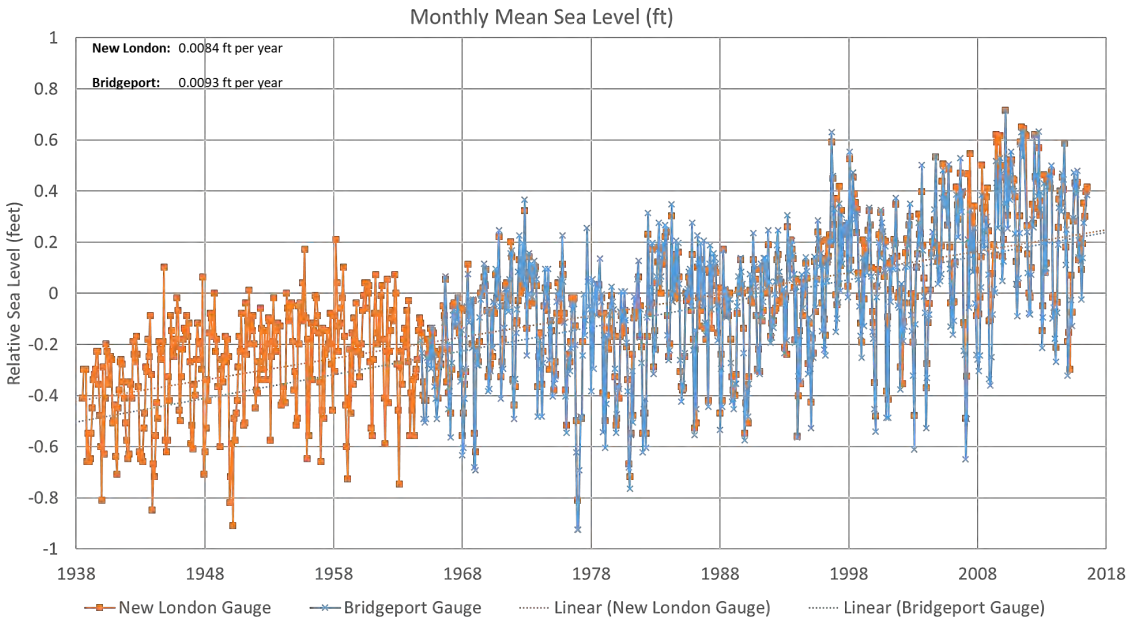


Figure 4-16 Monthly Mean Sea Level (Ft)

PROBABILITY OF FUTURE EVENTS

Sea level rise is expected to continue occurring along the Connecticut shoreline well into the future, with projections ranging from nearly 2 to nearly 7 feet by the end of the century. It is anticipated that the effects of climate change will increase the rate and severity of sea level rise, and perhaps more importantly, continued sea level rise will result in an increase in the extent and frequency of storm surge and coastal flooding.

Global Sea Level Rise Projections

In its landmark 2001 report, the IPCC projected that global sea level may rise 9 to 88 centimeters (0.30 - 2.89 feet) during the 21st century. According to the February 2007 update report by the IPCC, these predictions have been refined using six global climate models to project a more narrow range of sea level rise of 28 to 43 centimeters (0.92 to 1.41 feet) in the 21st century.

According to CIRCA, Connecticut communities should plan for "50 mm" (20 inches) of sea level rise by 2050

NOAA Technical Report NOS CO-OPS 083, titled Global and Regional Sea Level Rise Scenarios for the United States (January 2017) was prepared in partnership with the USGS, the USEPA, and Rutgers University. The report builds on and updates the December 2012 NOAA Technical Report OAR CPO-1, and is the current reference for sea level rise planning in the United States. The report indicates that by 2100 a rise in the global mean sea level in the range of 2.0 meters to 2.7 meters (6.6 to 8.9 feet) is more likely than previously thought. It also revises lower-bound estimates to 0.3 meters (0.98 feet) of rise by 2100. The report's updated global mean sea level range for the year 2100 is between 0.3 and 2.5 meters (0.98 and 8.2 feet) above current levels.

Local Relative Sea Level Rise Projections

Sea level rise is not consistent around the world, and as noted above is affected by local variations in currents, temperature, and changes in land surface elevation. It has long been expected that the rate of sea level rise in Connecticut will be slightly higher than the global projections due to the effects 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.

Sea Level along the Connecticut shoreline has risen 0.84 to 0.93 feet since NOAA began operating gauges here in the 1930s.

The 2017 NOAA report finds that local sea level along the Northeast Atlantic Coast is projected to be greater than the global average for almost all future scenarios. In Connecticut specifically, local sea level rise is projected to be 0 to greater than 1 meter (3.3 feet) higher than the rise in global mean sea level.

To provide more local guidance for Connecticut, The Connecticut Institute for Resilience and Climate Adaptation (CIRCA) at the University of Connecticut has developed local sea level rise scenarios. These localized scenarios were derived from the 2012 NOAA report, but modified to include the effects of local oceanographic conditions, more recent data and models, and local land motion. Based on the localized scenarios, **CIRCA recommends that Connecticut communities plan for 0.5 meters (1.64 feet) of sea level rise above 2001 levels by 2050**, and continued sea level rise beyond that date.

Figure 4-17 below graphically displays the four localized sea level rise scenarios developed by CIRCA. Note that CIRCA guidance on this matter is still in draft form, with final white papers to be released at a later date.

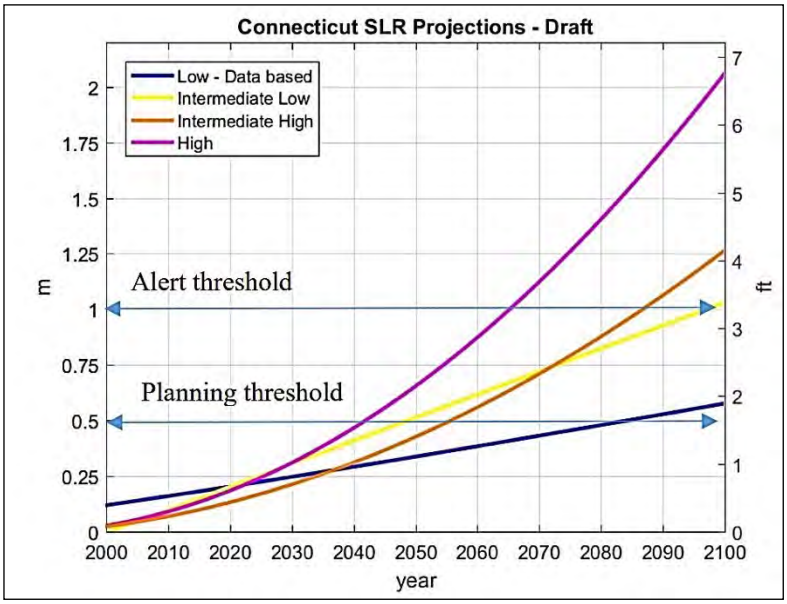


Figure 4-17 Four localized sea level rise scenarios in Connecticut

EARTHQUAKE

DESCRIPTION

An earthquake is the sudden motion or trembling of ground caused by an abrupt release of accumulated strain on tectonic plates that comprise the Earth's crust. As these plates move slowly and continuously over the interior of the earth, they collide, slide, catch, and hold – but eventually, when the mounting stress exceeds the elastic limit of the rock, faults along or near plate boundaries rupture or slip abruptly and an earthquake occurs. The ensuing seismic hazard effects on the Earth's surface include ground shaking, surface fault ruptures, and ground failures, which have the potential to cause widespread damage to buildings and infrastructure. Earthquakes may also provoke secondary hazards such as tsunamis, landslides, dam failures, or large fires ignited by ruptured gas lines.

The underground point of initial rupture is known as an earthquake's focus or hypocenter, and the point at ground level directly above the hypocenter is known as its epicenter. In general, the severity of the resulting ground motion increases with the amount of energy released and decreases with distance from the epicenter. Larger earthquakes usually begin with slight tremors but rapidly take the form of one or more violent shocks, and are followed by vibrations of gradually diminishing force called aftershocks. While the great majority of earthquakes strike near continental margins or in areas where large plates collide or move past each other, some, including those in the Northeast United States, can occur within plate boundaries.

LOCATION

The entire planning area is uniformly susceptible to the occurrence of earthquakes. Unlike other areas of the country where earthquakes occur along known fault lines, earthquakes in the Northeast do not correlate with the many known faults that exist in the region. They occur in the middle of plates, far from the plate boundaries.

Figure 4-18 shows peak ground acceleration and the location of epicenters for historically significant earthquakes across the Northeast United States according to the United States Geological Survey (USGS).

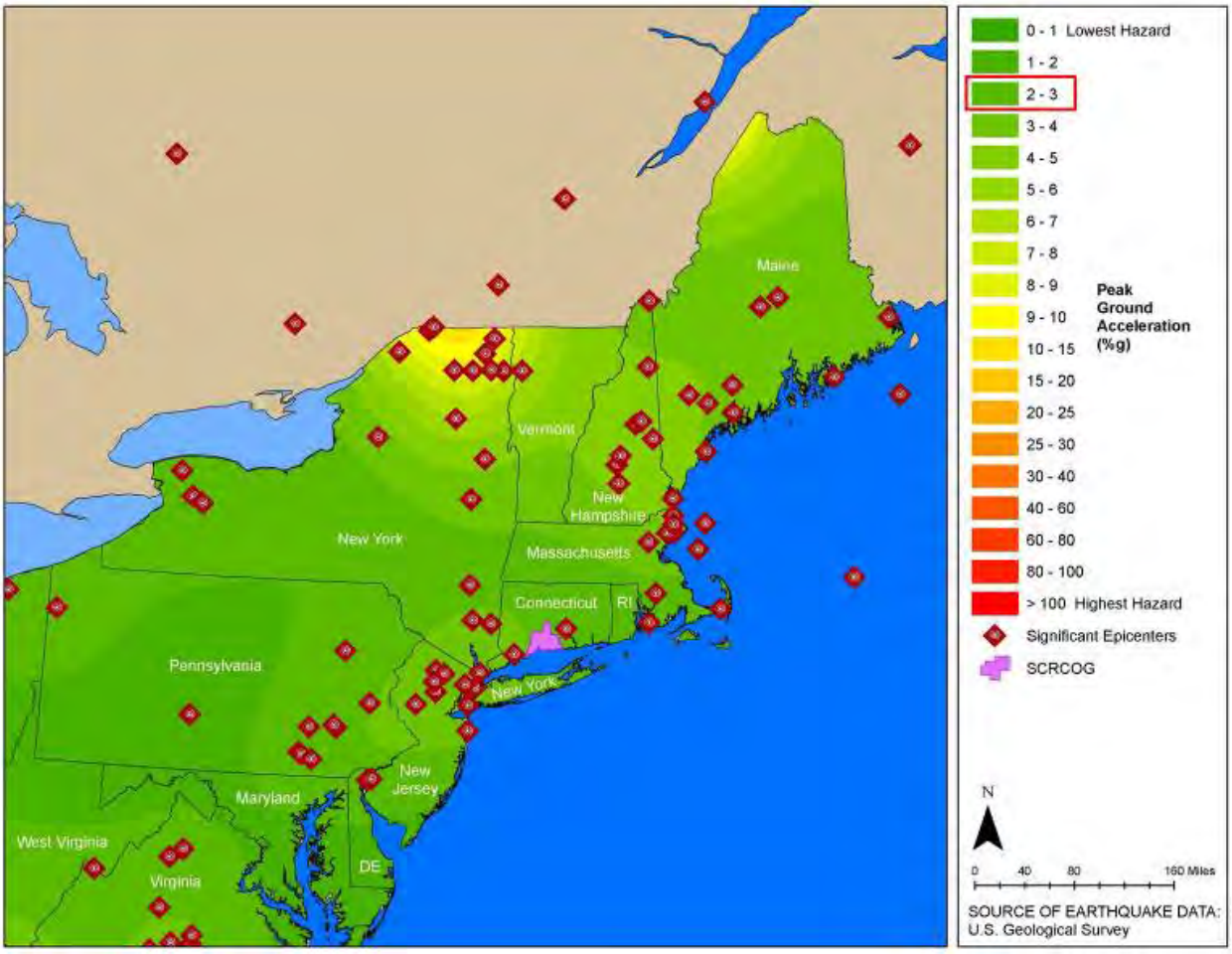


Figure 4-18 Peak Ground Acceleration and Historically Significant Earthquake Epicenters

Peak ground acceleration is the amount of earthquake generated ground shaking that, over a specified period of time, is predicted to have a specified chance of being exceeded. It is expressed as a percentage of the force of gravity (%g). Map 4.3 shows the peak acceleration with 10 percent probability of exceedance in 50 years, a common standard for USGS earthquake hazard maps. The entire planning area falls within a zone with a peak ground acceleration value of 2-3%g, which is considered a low risk zone.

Significant earthquakes, as defined by the USGS, are those "within or near to the United States that caused deaths, property damage, or geological effects, or that were experienced by populations in the epicentral area." More information on past notable earthquakes for the planning area is provided below under *Previous Occurrences*.

EXTENT

The magnitude of an earthquake is a measure of the amount of energy released as seismic waves at the hypocenter. The Richter Scale classifies earthquake magnitude as determined from measurements recorded by seismographs, and according to a single number on an open-ended logarithmic scale. Each unit increase in magnitude on the Richter Scale corresponds to a ten-fold increase in wave amplitude, or a 32-fold increase in energy.

The intensity of an earthquake is a measure of the strength of ground shaking and its effects on the Earth's surface at a certain location. Intensity is most commonly measured using the Modified Mercalli Intensity Scale, which is based on observed seismic effects versus any mathematical basis. The Scale is composed of 12 increasing levels of intensity (designated by Roman numerals) that range from imperceptible shaking to catastrophic destruction.

Table 4-23 summarizes the range of magnitudes and related intensities for earthquakes according to the Richter and Modified Mercalli Intensity (MMI) scales, along with abbreviated descriptions of effects on people, human structures, and the natural environment near the epicenter.

Table 4-23 Classification of Earthquake Magnitude and Intensity

Magnitude (Richter Scale)		Typical Maximum Intensity (MMI Scale)	Abbreviated Description of Effects (Near Epicenter)
1.0 to 3.0		I	Not felt except by a very few under especially favorable conditions.
3.0 to 3.9		II	Felt only by a few persons at rest, especially on upper floors of buildings.
		III	Felt quite noticeably by persons indoors, especially on upper floors of buildings. Many people do not recognize it as an earthquake. Standing motorcars may rock slightly. Vibrations similar to the passing of a truck. Duration estimated.
4.0 to 4.9		IV	Felt indoors by many, outdoors by few during the day. At night, some awakened. Dishes, windows, doors disturbed; walls make cracking sound. Sensation like heavy truck striking building. Standing motorcars rocked noticeably.
		V	Felt by nearly everyone; many awakened. Some dishes, windows broken. Unstable objects overturned. Pendulum clocks may stop.
5.0 to 5.9		VI	Felt by all, many frightened. Some heavy furniture moved; a few instances of fallen plaster. Damage slight.
	6.0 to 6.9	VII	Damage negligible in buildings of good design and construction; slight to moderate in well-built ordinary structures; considerable damage in poorly built or badly designed structures; some chimneys broken.

Magnitude (Richter Scale)		Typical Maximum Intensity (MMI Scale)	Abbreviated Description of Effects (Near Epicenter)
7.0 and higher		VIII	Damage slight in specially designed structures; considerable damage in ordinary substantial buildings with partial collapse. Damage great in poorly built structures. Fall of chimneys, factory stacks, columns, monuments, and walls. Heavy furniture overturned.
		IX	Damage considerable in specially designed structures; well-designed frame structures thrown out of plumb. Damage great in substantial buildings, with partial collapse. Buildings shifted off foundations.
		X	Some well-built wooden structures destroyed; most masonry and frame structures destroyed with foundations. Rails bent.
		XI	Few, if any (masonry) structures remain standing. Bridges destroyed. Rails bent greatly.
		XII	Damage total. Lines of sight and level are distorted. Objects thrown into the air.

Source: US Geological Survey

PREVIOUS OCCURRENCES

The Northeast region of the United States has a long history of earthquakes, though the vast majority of these had a calculated magnitude of less than 3.0. This includes more than 140 earthquakes centered in Connecticut since 1638, according to the Northeast States Emergency Consortium and New England Seismic Network.

The largest and most severe earthquake in Connecticut's history occurred at East Haddam on May 16, 1791. It has been estimated to be a VII intensity event. According to USGS records, stonewalls were shaken down, tops of chimneys were knocked off, and latched doors were thrown open.

The second strongest earthquake in Connecticut occurred near Hartford on November 14, 1925. Plaster was knocked from walls and dishes were shaken from shelves. More recently, an intensity V earthquake in southern Connecticut occurred on November 3, 1968. Plaster was reportedly cracked in Madison during this event, and small items fell and broke.

Other notable earthquakes occurred in Connecticut in 1837, 1840, 1845, 1858, 1875, 1953, all of which were moderate tremors that caused alarm but resulted in minimal damages. There have also been several earthquakes centered outside of Connecticut that were strongly felt in the state but caused little to no damage. This includes recent strong earthquakes centered in Virginia (2011) and Maine (2012). Earthquakes of note since the previous edition of this plan include:

- A magnitude 2.7 quake occurred beneath the town of Deep River on August 14, 2014, several miles east of the planning area.
- A series of quakes hit Plainfield, Connecticut on January 8, 9, and 12, 2015, north of the planning area in northeastern Connecticut. These events registered magnitudes of 2.0, 0.4, and 3.1, respectively. Residents in the Moosup section of Plainfield reported minor damage such as the tipping of shelves and fallen light fixtures.

PROBABILITY OF FUTURE EVENTS

Earthquakes with a magnitude of 3.0 and greater will remain an occasional occurrence in the planning area, however, based on historical data and USGS hazard maps, it is susceptible to only minor ground shaking events. It is anticipated that the effects of climate change will have no relation to the probability of future earthquake events.

WILDFIRE

DESCRIPTION

A wildfire is an unwanted, uncontrolled fire burning in an area of vegetative fuels such as grasslands, brush, or woodlands. Other names such as brush fire or forest fire may be used to describe the same phenomenon depending on the type of vegetation being burned. Heavier fuels with high continuity, steep slopes, high temperatures, low humidity, low rainfall, and high winds all work to increase the frequency and severity of wildfire for people and property located within wildfire hazard areas, and particularly for those in rural areas with limited capabilities for rapid fire suppression. When not quickly detected and contained, wildfires have the potential to cause extensive damage to property and threaten human life.

Wildfires are part of the natural management of many forest ecosystems, but most are caused by human ignition factors. Over 80 percent of wildfires are started by negligent human behavior during dry conditions such as improperly discarding cigarettes, burning debris, or extinguishing campfires in wooded areas. The second most common cause of wildfires is lightning strikes that occur during dry thunderstorms.

LOCATION

The wildland/urban interface is defined as the area where structures and other human development meet or intermingle with undeveloped wildland or vegetative fuels. Locations of wildfires hazard areas across the region were mapped by the SILVIS Laboratory at the University of Wisconsin[167] for the initial edition of this plan. These hazard areas included two types of wildland/urban interface areas: intermix and interface. Intermix areas are described as areas where housing and vegetation intermingle; interface areas are described as areas with housing in the vicinity of contiguous wildland vegetation.

Jurisdiction-specific maps provided in the *Risk Analysis* section show locations of wildfire hazard areas for each participating jurisdiction. For the individual municipalities, areas of risk were developed by considering distances from public water systems and large bodies of water, and excluding highly urbanized areas. Impervious surfaces from CT Eco land use maps were also eliminated. Then contiguous areas of 50 acres or more were analyzed against

[167] Radeloff, V.C., R.B. Hammer, S.I Stewart, J.S. Fried, S.S. Holcomb, and J.F. McKeefry. (2005). The Wildland Urban Interface in the United States. Ecological Applications 15: 799-805.

2010 CT ECO land cover data. Any area that was classified as a type of forested or grassed area was selected. A 50 ft. buffer was added to simulate the effect of wildfires on parcels and structures at the wildland/urban interface.

EXTENT

The magnitude of wildfire events is often characterized by their speed of propagation, total number of acres burned, and potential destructive impacts to people and property. The magnitude and severity of wildfires is greatly dependent on weather, fuel conditions, topography, and existing fire detection, control and suppression capabilities.

PREVIOUS OCCURRENCES

The Forestry Division of CT DEEP maintains statistical records of past wildfire occurrences that were reported from local Fire Marshals and Fire Departments throughout the state. According to these records there have been 330 wildfire incidents reported in the planning area since 1991, however the average size (total acres burned) per occurrence is very small at only 3.36 acres. **Table 4-24** summarizes these statistics for each jurisdiction in the planning area. As can be seen in the table, most of the historically reported wildfire events have occurred in the Town of Hamden, and according to local officials, most of these were located in Sleeping Giant State Park in the northeastern portion of town (and not in proximity to human development).

According to the State Forest Fire Supervisor there are no recorded property damages or human casualties attributed to these events, and it is believed that many additional small fires have occurred in the planning area but gone unreported to the State.

Table 4-24 Statistics on Reported Wildfire Occurrences in Planning Area (2015 - April 2018)

Jurisdiction	2015		2016		2017		2018		Annual Average		
	Fires	Total Acres	Fires	Total Acres	Fires	Total Acres	Fires	Total Acres	Fires	Total Acres	Average Acreage
Bethany	0	0.0	0	0.0	5	25.6	0	0.00	1.25	6.39	5.11
Branford	0	0.0	0	0.0	0	0.0	0	0.00	0	0.00	0.00
East Haven	0	0.0	0	0.0	0	0.0	0	0.00	0	0.00	0.00
Guilford	0	0.0	0	0.0	0	0.0	0	0.00	0	0.00	0.00
Hamden	1	0.1	1	1.0	2	0.2	1	0.25	1.25	0.39	0.31
Madison	0	0.0	0	0.0	0	0.0	0	0.00	0	0.00	0.00
Milford	0	0.0	1	0.5	0	0.0	0	0.00	0.25	0.13	0.50
New Haven	1	0.5	1	0.1	0	0.0	0	0.00	0.5	0.15	0.30
North Branford	0	0.0	0	0.0	0	0.0	0	0.00	0	0.00	0.00
North Haven	0	0.0	1	3.0	1	0.1	0	0.00	0.5	0.78	1.55
Orange	0	0.0	0	0.0	0	0.0	0	0.00	0	0.00	0.00
Wallingford	0	0.0	2	0.4	0	0.0	0	0.00	0.5	0.09	0.18
West Haven	0	0.0	0	0.0	0	0.0	0	0.00	0	0.00	0.00
Woodbridge	0	0.0	0	0.0	0	0.0	0	0.00	0	0.00	0.00
Total	**2**	**0.6**	**6**	**5.0**	**8**	**25.9**	**1**	**0.25**	**4.25**	**7.92**	**1.86**

Source: State of Connecticut, Department of Energy and Environmental Protection

PROBABILITY OF FUTURE EVENTS

Wildfires will continue to be a highly likely occurrence in the planning area, though the magnitude and impact of these events will be minimal due to some aggressive forest/fuels management programs, as well as early detection and fire suppression. It is anticipated that the effects of climate change, including more frequent and prolonged drought conditions, will increase the frequency and intensity of wildfire events.

The Connecticut Natural Hazard Mitigation Plan Update (2014) includes a detailed narrative about changing risk. The plan notes that "The USDA Forest Service states that wildland and forest ecosystems are very complex and it is difficult to project what the exact impacts of climate change may be on such systems. Climate change studies for the Northeast indicate that over the next century, the existing forest habitat range may move 300 to 500 miles northward. Thus trees and vegetation currently found in the forests and wildland areas of Connecticut today would be replaced over the next century with tree species and vegetation more adapted to a warmer climate. This change in the flora composition will have an effect on the existing risk of wildland fires due to changes in the fuel load wildland areas will develop. In addition, it has been projected that climate change will have an effect on the state's wildland areas by creating a warmer climate more conducive to invasive plant species and destructive vectors that will change the fire regime."

This related factor is expected to increase the probability of future wildfire events. The introduction of disease, pests, and invasive plants that result in the dieback of mature tree species will create increased vegetative fuel loads in wildland areas. For example, the Emerald Ash Borer has caused considerable tree mortality in the western part of the South Central Region. More detail regarding the Ash Borer Beetle may be found in the Planning Area Profile.

RISK ANALYSIS

The Risk Analysis section provides detailed risk and vulnerability information for each participating jurisdiction. This includes a summary account of the following:

- **Critical Facilities:** An inventory of buildings and infrastructure deemed essential by each participating jurisdiction, including emergency response facilities, government buildings, emergency shelters, utility facilities and infrastructure, healthcare facilities, and senior or low-income living facilities.
- **Vulnerable Assets:** Community assets (buildings, infrastructure, and populations) that may be susceptible to damage from a given hazard based on GIS (geographic information system) inventories.
- **Potential Impacts:** The consequences or effects of a hazard on the jurisdiction and its community assets.
- **Loss Estimates:** Potential monetary losses that reflect physical, economic, or social damages.
- **Problem Statements:** Statements of particular interest with regard to primary hazards of concern, geographic areas of concern, and vulnerable community assets. These statements were primarily derived from discussion with local municipal officials during Advisory Committee Meetings and individual Jurisdiction meetings and local site visits, in addition to GIS-based analysis using best available data. They were generated to assist in the early identification and analysis of potential mitigation actions for each jurisdiction.

OVERVIEW

This section builds upon the information provided in the previous *Hazard Identification* and *Hazard Analysis* sections by identifying and characterizing an inventory of at-risk assets for each jurisdiction and then assessing the potential impact and amount of damages that can be expected from each identified hazard event.

The primary objective of the risk analysis is to quantify exposure and potential loss estimates for each hazard. In so doing, participating jurisdictions better understand their unique risks to identified hazards and potential problem areas, which aids in evaluating and prioritizing mitigation actions.

This section is a compilation of 14 separate risk analyses—one for each participating jurisdiction—driven by the best available data for each jurisdiction. This yields stronger results than conducting one overall analysis for the entire planning area, where differences and gaps in data would essentially limit the analysis in many instances to a "lowest common denominator" in terms of uniformity in the datasets.

METHODOLOGY

B3. Is there a description of each identified hazard's impact on the community as well as an overall summary of the community's vulnerability for each jurisdiction? §201.6(c)(2)(ii)

VULNERABLE ASSETS

Several sets of asset inventories were used for the risk analysis. Where available and appropriate, local datasets containing critical facilities and other locations of community interest and/or value were used to determine vulnerable assets. Historic resources were inventoried from local records in the initial HMP and mapped for this update using spatial data developed by SHPO in 2015-2017. For the HAZUS analysis, information on police stations, fire stations, hospitals, and schools was derived from the existing HAZUS datasets, including numbers of structures and estimated building values. In some instances, building replacement values from Hazus-MH were used to fill gaps in local data for residential, commercial, and industrial buildings at risk.

The following are certain hazard-specific data, methods, and assumptions that were used in the analysis.

Coastal Erosion

- When the initial HMP was developed, data did not exist to prepare accurate or meaningful exposure analysis or loss estimation for this hazard. In July 2014, the publication *Analysis of Shoreline Change in Connecticut* was published by DEEP, Sea Grant, and UConn/CLEAR. This publication and its GIS dataset were used for the HMP update. The GIS data delineates former shoreline positions for Milford, West Haven, New Haven, East Haven, Branford, Guilford, and Madison.
- Milford, West Haven, Branford, Guilford, and Madison have prepared municipal coastal resilience plans. Narrative descriptions of erosion were taken from these plans as appropriate.

Dam Failure

- Assets potentially vulnerable to dam failure were determined based on dam failure inundation mapping available for 15 high hazard dams in the planning area. Class B dam inundation areas were not mapped for the focus region.
- Source of dam data: CT DEEP.

Drought

- It is assumed that drought would not cause direct physical damage to buildings, critical facilities, and populations, although hardships and indirect damages could potentially occur during extended periods of drought conditions.
- Annualized loss estimates for this hazard are based on historical damages reported to the National Centers for Environmental Information (NCEI, previously the National Climatic Data Center) of the National Oceanic and Atmospheric Administration.

Earthquake

- The numbers and values of vulnerable assets for the earthquake hazard are total exposure values, assuming that all buildings and populations would be equally exposed to the effects of this hazard.
- Hazus-MH version 4.0 was used to calculate estimated losses for this hazard.
- The largest earthquake in Connecticut history occurred in East Haddam on May 16, 1791. For the loss estimate calculated using Hazus-MH 4.0, this event was simulated. Specific parameters include:
    - Longitude of epicenter: -72.40
    - Latitude of epicenter: 41.50
    - Depth: 10.00 km.
    - Magnitude: 6.40
    - Attenuation function: CEUS 2008

Extreme Temperatures

- Estimates of vulnerable populations for the extreme temperatures hazard is based on elderly age 65 and over.
- Annualized loss estimates for this hazard are based on historical damages reported to the National Centers for Environmental Information (NCEI, previously the National Climatic Data Center) of the National Oceanic and Atmospheric Administration.

Flood

- Exposure results for the flood hazard are not cumulative. In other words, the number of buildings intersecting the 0.2-percent-annual-chance floodplain does not include the number of buildings intersecting the 1-percent-annual-chance floodplain. Numbers and values of assets for events of increasing magnitude should be read as “in addition to” the preceding magnitudes.

- Exposure results for the storm surge hazard are also not cumulative. In other words, the number of buildings intersecting the Category 2 storm surge inundation area does not include the number of buildings intersecting the Category 1 storm surge inundation area. Numbers and values of assets for events of increasing magnitude should be read as "in addition to" the preceding magnitudes.
- Digital Flood Insurance Rate Map (DFIRM) data was identified as best available data and therefore utilized for this analysis. Included in the DFIRM data are the 1-percent-annual-chance floodplain (Zone A/AE), the 0.2-percent-annual-chance floodplain, and Zone VE.
- Hazus-MH version 4.0 was used to calculate estimated losses for the riverine and coastal components of this hazard using the riverine model for riverine flooding and the coastal model for coastal flooding.
- The calculations for riverine flooding and coastal flooding are handled separately within Hazus-MH using distinct methodologies for riverine and coastal flood hazard areas. As such, loss estimates and annualized losses for these two separate types of flooding do not always correlate when compared with one another. Depth of flooding plays a large part in the difference between the riverine results and the coastal results for the planning area, in addition to the mapped flood hazard boundaries.
- Differentiation between riverine and coastal hazard areas:
    - The Connecticut DFIRM stores BFE figures in one of two ways:
        - For coastal flood zones and lakes, the BFE is stored in the Special Flood Hazard Area (SFHA) polygon shapefile as an attribute titled "Static BFE."
        - For riverine flood zones, BFE values are stored in cross-section polylines as attributes titled either "WSEL-REG" or "BFE," depending on the type of cross section
    - For the purpose of modeling flood damages in Hazus-MH, riverine and coastal flood areas were differentiated as follows:
        - Flood hazard areas were modeled as coastal if the SFHA polygon as mapped in the DFIRM included a "Static BFE" figure and was along the coastline.
        - Flood hazard areas were modeled as riverine if the SFHA polygon did not include a "Static BFE" figure, and FEMA cross-sections were mapped that did have either "WSEL-REG" or "BFE" figures
        - SFHA polygons that did not include a "Static BFE" figure, and for which no FEMA cross-sections with either "WSEL-REG" or "BFE" figures were available, were not included in the Hazus-MH model
- Coastal flood hazard results are presented for Milford, West Haven, New Haven, Hamden, North Haven, East Haven, Branford, Guilford, and Madison.
- Riverine flood extents and depths were determined using the Hazus-MH Flood Information Toolkit (version 2.1). Toolkit results were input into Hazus-MH version 4.0 to calculate losses.
- Source of flood hazard data: Federal Emergency Management Agency Preliminary DFIRM (Digital Flood Insurance Rate Map) data; National Flood Insurance Program (NFIP) records.
- Source of hydrology data (for mapping purposes): State of Connecticut Department of Energy and Environmental Protection (http://www.ct.gov/deep/cwp/view.asp?a=2698&q=322898&depNav_GID=1707)
- Source of storm surge inundation data: State of Connecticut Department of Energy and Environmental Protection (http://www.ct.gov/deep/cwp/view.asp?a=2698&q=322898&depNav_GID=1707)

Hurricane/Tropical Storm

- The numbers and values of vulnerable assets for the hurricane/tropical storm hazard are total exposure values, assuming that all buildings and populations would be equally exposed to the effects of this hazard.
- Hazus-MH version 4.0 was used to calculate estimated losses for the hurricane wind component of this hazard.
- Probabilistic hurricane conditions were used for Hazus-MH 4.0 calculations of hurricane damages. Storm conditions with return frequencies of 10-, 20-, 50-, 100-, 500-, and 1,000-years were used.

Sea Level Rise

- In the initial HMP, sea level rise data was provided by The Nature Conservancy and covered (from west to east) the jurisdictions of West Haven, Hamden, North Haven, Branford, and Madison. The sea level rise analysis was based on the "high" estimate of projected mean high water inundation in the year 2080 due to sea level rise (not inclusive of any storm surge scenario). The Nature Conservancy used a scenario of a 1-meter rise in sea level in its mapping approach. In 2013 when the initial HMP was developed, this was an appropriate planning method.
- In January 2017, NOAA published updated global and regional sea level rise scenarios (NOAA Technical Report NOS CO-OPS 083). In fall 2017, CIRCA released for public comment the downscaled sea level rise projections for Connecticut. Because the CIRCA projections will eventually be adopted for planning in Connecticut, they are used for this update.
- Sea level rise extent is mapped using "bathtub model" methodology; all land areas below the elevation of Mean Higher High Water (MHHW) plus the sea level rise value is considered to be submerged by that sea level condition.

Severe Thunderstorm

- The numbers and values of vulnerable assets for the severe thunderstorm hazard are total exposure values, assuming that all buildings and populations would be equally exposed to the effects of this hazard.
- Annualized loss estimates for this hazard are based on historical damages reported to the National Centers for Environmental Information (NCEI, previously the National Climatic Data Center) of the National Oceanic and Atmospheric Administration.

Severe Winter Storm/Nor'easter

- The numbers and values of vulnerable assets for the severe winter storm/nor'easter hazard are total exposure values, assuming that all buildings and populations would be equally exposed to the effects of these hazards.

Tornado

- The numbers and values of vulnerable assets for the tornado hazard are total exposure values, assuming that all buildings and populations would be equally exposed to the effects of these hazards.
- Annualized loss estimates for this hazard are based on historical damages reported to the National Centers for Environmental Information (NCEI, previously the National Climatic Data Center) of the National Oceanic and Atmospheric Administration.

Wildfire

- Wildfire risk zones were mapped using a methodology that highlights land cover, extent of contiguous forested or grassed areas, and distance from water sources.
- In a GIS, the land area of all SCRCOG towns participating in the plan was assessed as a single unit. From this area of land, impervious surfaces, areas served by water systems, and waterbodies (rivers, streams, lakes, and ponds) were removed. Contiguous areas of 50 acres or more were identified and analyzed against 2010 CT ECO land cover data. Any area that was classified as a type of forested or grassed area was selected as a wildfire risk area. A 50-foot buffer was then added to the resulting shape to include the wildland-urban interface.
- Data Sources: CT DEEP (hydrography & waterbodies), CT DPH (public water systems), CT ECO (land cover: impervious surfaces, forested and grassed areas).

POTENTIAL IMPACTS

The potential impacts section is primarily an exposure analysis identifying the numbers of parcels, buildings (where building footprint data was available), critical facilities, historic assets (where data was available), and people that intersect known hazard areas, based on GIS analysis.

It is important to note that these are total numbers potentially at risk from each hazard type, and do not reflect any one hazard event scenario. For example, 200 buildings may intersect all 1-percent-annual-chance floodplains within a community, and thus be at risk from a 1-percent-annual-chance flood, but not all floodplain areas may flood during a given flood event. Similarly, 200 buildings may intersect the 1-percent-annual-chance floodplain but all 200 buildings may be elevated sufficiently above the base flood elevation so as to reduce their vulnerability significantly. Therefore, the numbers in this section are simply an indicator of the total number of assets potentially exposed to the hazard and of potential interest in the mitigation planning process.

The parcels and buildings identified as having vulnerabilities were found by intersecting parcel and building shapefiles, generated by SCRCOG and CT-ECO, with hazard zone shapefiles generated as described in the previous section.

The population exposed to various hazards was estimated by using data from the 2010 U.S. Census; the most recently available census data. In most cases, the number of occupants per household was multiplied by the number of buildings in the hazard area to determine vulnerable populations. This assumes that there is one household per building. Densely populated areas were considered on a case by case basis, as there may be significantly more households per building than in suburban areas. It is important to note, however, that large residential apartment buildings tend to have been constructed away from many hazard areas, such that the buildings with the highest exposure to hazards tend to be single family residences.

LOSS ESTIMATES

Loss estimates were derived from several sources: the Hazus-MH loss estimation methodology provided by FEMA; statistical analysis based on historical hazard occurrences; the Connecticut Hazard Mitigation Plan Update (2014); and data provided by municipalities. In most instances, loss estimates result in an Annualized Loss Estimate (ALE)

that provides an understanding of potential future losses for a given hazard relative to other hazards studied. In some instances, the ALE was determined to be "negligible" if it was a dollar value less than $5,000. This is a standard dollar value used in previously approved plans to represent the distinction between negligible annualized losses and meaningful annualized losses for purposes of analysis, ranking, and planning.

Hazus-MH Loss Estimation Methodology

FEMA's Hazus-MH loss estimation methodology was used to determine potential losses for the hurricane (wind only), flood (riverine and coastal), and earthquake hazards.

Annualized losses for the hurricane wind hazard include building and contents damages and inventory, relocation, capital, wage and rental income losses.

Hazus-MH version 4.0 was used for all municipalities except New Haven. New Haven loss-estimates were taken from the 2017 New Haven municipal HMP; Hazus-MH version 3.1 was used for that document. Both versions utilize census 2010 data.

For all municipalities, the HAZUS results from the previous version of the plan and the current version of the plan are provided side-by-side.

Statistical Analysis Methodology

For the severe thunderstorm, severe winter storm/nor'easter, and tornado hazards, total historical losses from the National Centers for Environmental Information (NCEI; formed from the consolidation of the National Climatic Data Center, the National Geophysical Data Center, and the National Oceanographic Data Center) of the National Oceanic and Atmospheric Administration for each hazard were divided by the number of years for which data was available and then divided by the number of jurisdictions impacted to determine an Annualized Loss Estimate for each town.

This approach was utilized for other hazards included in this risk analysis as well, such as drought and wildfire, if historical losses existed for those hazards.

Comparison to the Previous HMP

Where available, the Hazus-MH generated loss estimates from the previous version of the plan and the current version of the plan are provided side-by-side. In most cases, the loss estimates calculated for this HMP update differ from those calculated for the previous edition of the plan. Differences may have been caused by a combination of the following:

- Changes in methodology: in this plan update, the Hazus-MH FIT tool was used to delineate flood extents and calculate flood depths; the tool is only capable of modeling flooding in areas where flood elevations have been determined. The previous methodology may have been different.
- Changes in definition: in the previous HMP, inland flood-zones were defined as FEMA SFHA zones designated A or AE, while coastal flood zones were defined as FEMA SFHA zones designated VE; in this update, the definitions of inland and coastal flood zones (described earlier in this section) shift more of the estimated flood losses into the coastal category.

- Changes in data: the New Haven County FIS and FIRM have been revised and updated since the previous HMP was adopted, so calculated flood extents and depths may have changed; in the previous HMP, the Hazus-MH modeling utilized year 2000 census data, while this edition uses 2010 data.
- Changes in the model: The previous HMP utilized Hazus-MH version 2.1; this edition utilizes the most up-to date model, Hazus-MH version 4.0

Additionally, the Hazus-MH analysis run for earthquake damages in the previous edition of this HMP showed no expected loss due to a "100-year earthquake." In this edition, an earthquake with a different magnitude and epicenter was run using the updated Hazus-MH version 4.0, explaining the change in results.

In each community section below, the likely primary cause of changes in each hazard loss estimate is noted.

PROBLEM STATEMENTS

Problem statements consist of a compilation of anecdotal information as obtained from local community officials as well as some findings of the GIS-based risk analysis. If applicable, potential solutions or mitigation actions are also discussed with problem statements. The purpose of this section is to leverage the risk assessment process in a way that supports the development of a meaningful mitigation strategy.

COMMUNITY ASSETS

B4. Does the Plan address NFIP insured structures within the jurisdiction that have been repetitively damaged by floods? §201.6(c)(2)(ii)

PEOPLE

The total population for the planning area according to the 2010 census is 274,963. (The total population for New Haven County as a whole is 862,477 as of the 2010 census.) **Table 4-25** lists 2010 population numbers for each participating jurisdiction along with populations that may have unique vulnerabilities (elderly age 65 and over and youth under the age of 18,). The information is presented in descending order based on total population.

Table 4-25 Population Distribution by Jurisdiction[168]

Jurisdiction	2010 Population	Elderly (Age 65+)	Youth (Under 19)
Bethany	5,563	783	1,466
Branford	28,026	5,387	5,432
East Haven	29,257	5,136	6,317
Guilford	22,375	3,913	5,625
Hamden	60,960	9,171	14,852
Madison	18,269	3,318	5,096
Milford	52,759	8,585	11,488
New Haven	129,779	11,996	35,951
North Branford	14,407	2,522	3,487
North Haven	24,093	4,792	5,448
Orange	13,956	2,664	3,490
Wallingford	45,135	7,436	10,387
West Haven	55,564	6,912	14,142
Woodbridge	8,990	1,718	2,293
Total	**509,133**	**74,333**	**125,474**

The City of New Haven has by far the largest population in the study area (129,779), followed by the Town of Hamden (60,960), the City of West Haven (55,564), and the City of Milford (52,759). Bethany has the smallest population (at 5,563) and Woodbridge has the second smallest (at 8,990).

Populations with Unique Vulnerabilities

Populations with unique vulnerabilities include students and visiting populations associated with colleges and universities, which would include Quinnipiac University in Hamden, the University of New Haven in West Haven, Yale West in West Haven, Southern Connecticut State University in New Haven, and Yale University in New Haven.

Special needs populations can include hospital patients, which would include Gaylord Hospital in Wallingford (with an estimated 88 beds), Masonic Hospital in Wallingford (with an estimated 503 beds), the Connecticut Hospice in Branford (with an estimated 52 beds), Milford Hospital in Milford (with an estimated 52 beds), and the Yale-New Haven Hospital and St. Raphael Hospital in New Haven (with an estimated 1,300 beds combined).169

Built Environment

Critical Facilities

Critical facilities are structures and institutions necessary for a community's response to and recovery from emergencies. Critical facilities must continue to operate during and following a disaster to reduce the severity of

[168] Based on 2010 Census data obtained from http://www.census.gov.
[169] Based on data from Hazus-MH default inventories.

impacts and accelerate recovery.[170] Critical facilities may include airports, emergency operations centers (EOCs), fire stations, hospitals and medical facilities, police stations, rail stations, schools, shelters, and town halls. A table of critical facilities provided by each town is presented in the sections dedicated to each jurisdiction.

Cultural Resources and Historic Assets

Cultural resources and historic assets are generally unique or irreplaceable in nature due to their age or unique properties or characteristics. Museums, geological sites, concert halls, parks, stadiums, and other such assets are important to a community and can be considered a cultural resource. Officially recognized cultural resources and historic assets can be found on lists maintained as part of the National Register of Historic Places, State historic registries, and local historical preservation societies. **Table 4-26** provides a list of known cultural resources and historic assets within the planning area.

Table 4-26 Cultural Resources and Historic Assets

Cultural Asset	National Register of Historic Places[171]	Local Designation
Bethany		
Stanley Downs Memorial Building		X
Russell Farm and Outbuildings		X
Christ Episcopal Church		X
Congregational Church		X
Branford[172]		
Branford Center Historic District	X	
Branford Point Historic District	X	
Canoe Brook Historic District	X	
Route 146 Historic District	X	
Stony Creek-Thimble Islands Historic District	X	
More than 20 historic homes	X	
East Haven		
East Haven Green Historic District	X	
Monuments & Memorials	X	
Hexagonal Bandstand	X	
21 Historic Homes & Buildings	X	
East Lawn & Town Cemeteries	X	
First Congregational Church of East Haven	X	
Branford Electric Railway Historic District	X	
Guilford		
Acadian House	X	
Thomas Burgis II House	X	
Dudleytown Historic District	X	
Jared Eliot House	X	

[170] Federal Emergency Management Agency, *Local Mitigation Planning Handbook*, Washington, Federal Emergency Management Agency, 2012. Available at: http://www.fema.gov/hazard-mitigation-planning-resources

[171] Data obtained from the National Register of Historic Places database at: http://nrhp.focus.nps.gov/natreghome.do?searchtype=natreghome

[172] The Town of Branford has a total of 969 historic sites according to local GIS data.

Cultural Asset	National Register of Historic Places[171]	Local Designation
Falkner's Island Lighthouse	X	
Griswold House	X	
Guilford Historic Town Center	X	
Hyland-Wildman House	X	
Pelatiah Leete House	X	
Medad Stone Tavern	X	
Meeting House Hill Historic District	X	
Elisha Pitkin House	X	
Sabbathday House	X	
Henry Whitfield House	X	
709 Locally Significant Historic Structures		X
Hamden		
Alphonso Johnson House	X	
Atwater-Linton House	X	
George Atwater House	X	
Elam Ives House	X	
Eli Whitney Boardinghouse	X	
Eli Whitney Gun Factory (Museum)	X	
Farmington Canal Lock No. 13	X	
Hamden Bank & Trust Building	X	
Hamden High School	X	
Hamden Memorial Town Hall	X	
Mount Carmel Congregational Church and Parish House	X	
Jonathan Dickerman House	X	
Orrin Todd House	X	
Pistol Factory Dwelling	X	
Sleeping Giant Tower	X	
Whitneyville Congregational Church	X	
Madison		
Allis-Bushnell House	X	
Deacon John Graves House		X
Hammanasset Paper Mill Site	X	
Jonathan Murray House	X	
Madison Green Historic District	X	
Meigs-Bishop House	X	
Memorial Town Hall (Archives)		X
Shelley House	X	
State Park Supply Yard	X	
Milford		
Milford Historic District	X	X
River Park National Historic District	X	
South of the Green Historic District		X
412 sites of local significance		X
New Haven		
17 Historic Districts	X	
13 Historic Homes	X	
6 Historic Buildings	X	
4 Historic Factories	X	
3 Historic Churches	X	

Cultural Asset	National Register of Historic Places[171]	Local Designation
3 Historic Municipal Facilities	X	
2 Historic Parks	X	
2 Historic University Facilities	X	
Fort Nathan Hale	X	
Farmington Canal-New Haven and Northampton Canal	X	
Grove Street Cemetery	X	
Lighthouse Point Carousel	X	
Lincoln Theatre	X	
The Yale Bowl	X	
City Point Historic District		X
Quinnipiac River Historic District		X
Wooster Square Historic District		X
5 State-Register Historic Districts		X
North Branford		
Fourth District School	X	
George Baldwin House	X	
Gordon S. Miller Museum		X
Howd-Linsley House	X	
Little Red School House		X
Little White Gas Station		X
Maltby-Stevens Factory Site	X	
North Branford Center Historic District	X	
Northford Center	X	
Reynolds-Beers House		X
North Haven		
Pines Bridge Historic District	X	
Rising Sun Tavern	X	
Orange		
Col. Asa Platt House	X	
Henry F. Miller House	X	
Orange Center Historic District	X	
Stone-Otis House		X
The Academy Museum		X
William Andrew House	X	
Wallingford		
Center Street Cemetery	X	
Franklin Johnson House	X	
John Barker House	X	
Joseph Blakeslee House	X	
Nehemiah Royce House	X	
Samuel Parsons House	X	
Samuel Simpson House	X	
Theophilus Jones House	X	
Wallingford Center Historic District	X	
Wallingford Railroad Station	X	
West Haven		
American Mills Web Shop	X	
Old West Haven High School	X	
Union School	X	

Cultural Asset	National Register of Historic Places[171]	Local Designation
Ward-Heitman House	X	
West Haven Green Historic District	X	
Captain Clark House		X
Merwin-Hubbard House		X
Christ Episcopal Church		X
860 Places of Local Significance		X
Yale West Art Collection		X
Woodbridge		
Chatfield Farmstead	X	
Cement Kiln on Litchfield Turnpike		X
Dr. Andrew Castle House	X	
New England Cement Company Kiln and Quarry	X	
Thomas Darling House and Tavern	X	
Woodbridge Green Historic District	X	

Other Existing Assets

Other existing assets include single and multi-family residential housing, commercial structures, industrial facilities, and other buildings, which includes education, government, and religious buildings. All structures are exposed to risk, but certain buildings or concentrations of buildings may be more vulnerable because of their location, age, construction type, condition, or use.[173] **Table 4-27** lists the number of residential, commercial, and industrial buildings in each jurisdiction.

Table 4-27 Other Existing Structures[174]

Jurisdiction	Total Number of Parcels[175]	Total Number of Buildings[176]	Residential Breakdown[177]	Commercial Breakdown[178]	Industrial Breakdown[179]
Bethany	2,479	2,980	2,269	135	48
Branford	13,078	11,785	10,271	775	274
East Haven	11,308	11,881	9,547	512	203
Guilford	10,522	11,351	8,926	583	225
Hamden	16,760	21,581	16,905	1,207	324
Madison	8,530	9,317	7,699	465	153
Milford	19,387	22,379	18,523	1,392	524
New Haven	23,711	27,514	23,572	2,875	535

[173] Local Mitigation Planning Handbook, Washington. (2012). Federal Emergency Management Agency. Retrieved from http://www.fema.gov/hazard-mitigation-planning-resources

[174] Note that building data is provided by the State building shapefile, while the building breakdown is provided by Hazus. Thus, the sum of Residential, Commercial, and Industrial buildings may not precisely equal Total Buildings.

[175] Based on GIS-based parcel data.

[176] Based on State building data.

[177] Based on data from Hazus-MH

[178] Based on data from Hazus-MH

[179] Based on data from Hazus-MH

Jurisdiction	Total Number of Parcels[175]	Total Number of Buildings[176]	Residential Breakdown[177]	Commercial Breakdown[178]	Industrial Breakdown[179]
North Branford	5,706	6,522	4,882	306	140
North Haven	9,114	10,923	8,317	666	270
Orange	6,061	5,959	4,865	478	120
Wallingford	14,146	18,866	14,574	1,013	385
West Haven	14,443	17,687	14,056	958	282
Woodbridge	3,606	4,117	3,272	268	68

BETHANY

CRITICAL FACILITIES – BETHANY

Table 4-28 contains a list of critical facilities provided by the Town of Bethany. These are depicted on Figure 4.6 along with FEMA flood zones.

Table 4-28 Critical Facilities - Bethany

Facility	Location	Emergency Power Supply?	Shelter?	In Floodplain or Coastal Flood Hazard Area?	In Surge Zones?
Emergency Services					
Fire Headquarters	460 Amity Road	Yes	No	No	No
Hinman Fire Station	300 Bear Hill Road	Yes	No	No	No
Municipal Facilities					
Elementary School	44 Peck Road	Yes	Yes	No	No
Middle School	190 Luke Hill Road	Yes	No	No	No
Town Hall	40 Peck Road	Transfer Switches	Limited	No	No
Old Airport	695 Amity Road	No	Yes	No	No

VULNERABLE ASSETS – BETHANY

Vulnerable assets were identified by intersecting GIS-based asset inventories and demographic data with known hazard boundaries to determine the number of parcels, buildings, critical facilities, historic assets, and populations exposed to each hazard. This results in an estimation of vulnerable assets by hazard as shown in Table 4-29. The historic resources listed in each jurisdiction are depicted on a map for each. **Figure 4-19** depicts the locations of critical facilities in Bethany and **Figure 4-20** depicts the locations of historic resources in the same area.

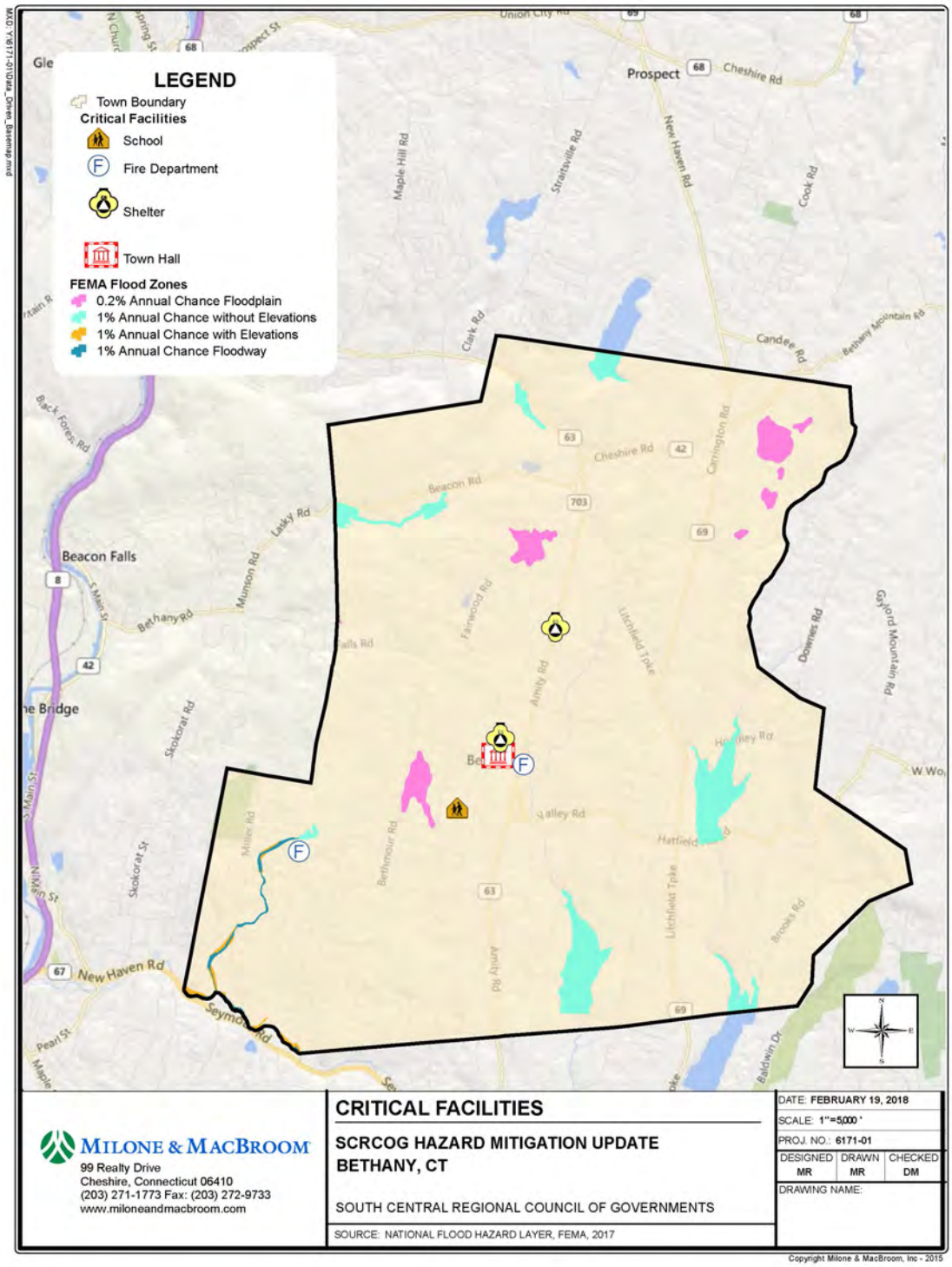


Figure 4-19 Critical Facilities and SFHA - Bethany

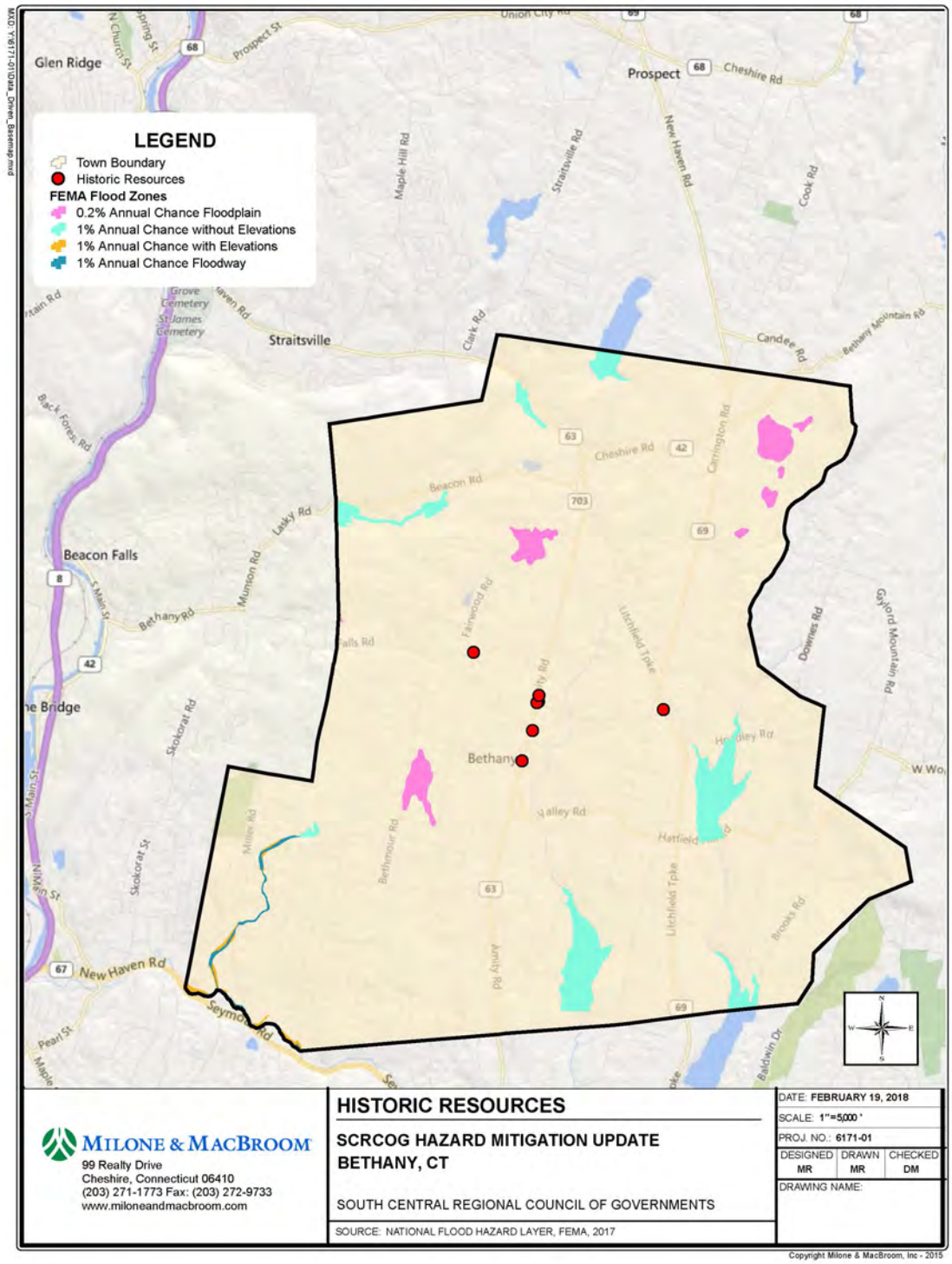


Figure 4-20 Historic Resources - Bethany

Table 4-29 Vulnerable Assets by Hazard - Bethany

Hazard	Number of Parcels[180]	Number of Buildings[181]	Critical Facilities[182]	Historic Assets[183]	Population[184]
Extreme Temperatures	2,479	2,980	6	13	784
Hurricane/Tropical Storm	2,479	2,980	6	13	5,563
Severe Thunderstorm	2,479	2,980	6	13	5,563
Severe Winter Storm/Nor'easter	2,479	2,980	6	13	5,563
Tornado	2,479	2,980	6	13	5,563
Dam Failure					
High Hazard (Class C)	194	67	0	0	182
Significant Hazard[185] (Class B)	N/A	N/A	N/A	N/A	N/A
Drought	2,479	2,980	6	13	5,563
Flood[186]					
1-Percent-Annual-Chance	86	14	0	0	38
0.2-Percent-Annual-Chance	26	0	0	0	0
Earthquake	2,479	2,980	6	13	5,563
Wildfire	2,337	2,636	2	5	5,563

Repetitive Loss and Severe Repetitive Loss Properties

According to FEMA records, there were no identified repetitive loss or severe repetitive loss properties in Bethany as of 2012. As of 2017, this has not changed. As of December 31, 2012, the Town of Bethany had a total of only 3 claims totaling $7,226 in losses for all NFIP-insured structures. As of 2017, this has not changed.

Figure 4-21 and **Figure 4-22** show dam failure and wildfire hazard areas within the Town of Bethany.

[180] Based on local data provided by the Town of Bethany.
[181] Based on building numbers from CT ECO.
[182] Based on critical facilities data from Hazus-MH consisting of fire stations, police stations, and schools.
[183] Based on local data provided by the Town of Bethany.
[184] Based on population numbers from 2010 census data.
[185] Dam failure inundation mapping was available for Class C dams. Inundation mapping was not available for other dams located in the town.
[186] Results for the flood hazard are not cumulative. Numbers and values of assets for events of increasing magnitude should be read as "in addition to" the preceding magnitudes.

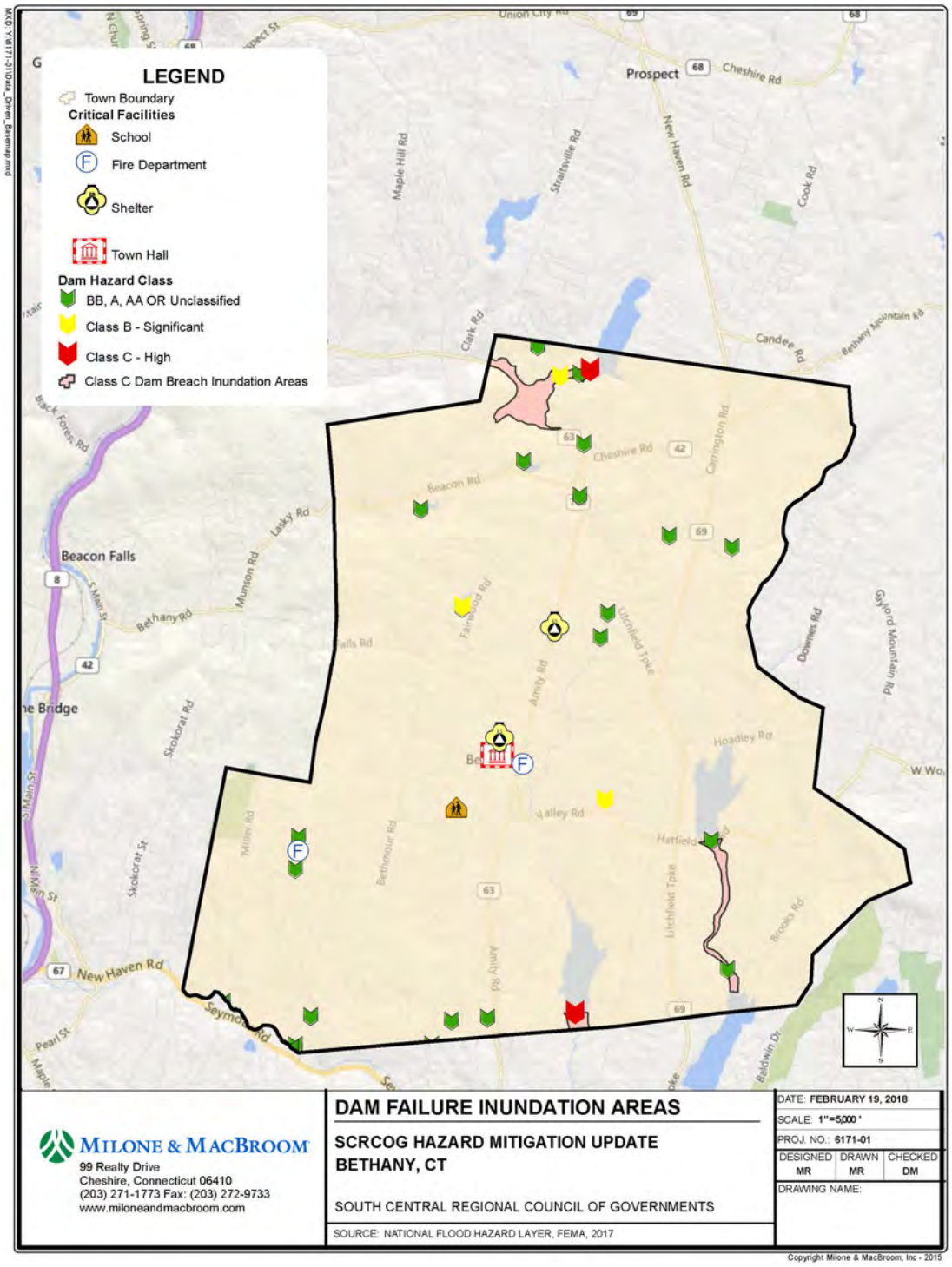


Figure 4-21 Dams Map - Bethany

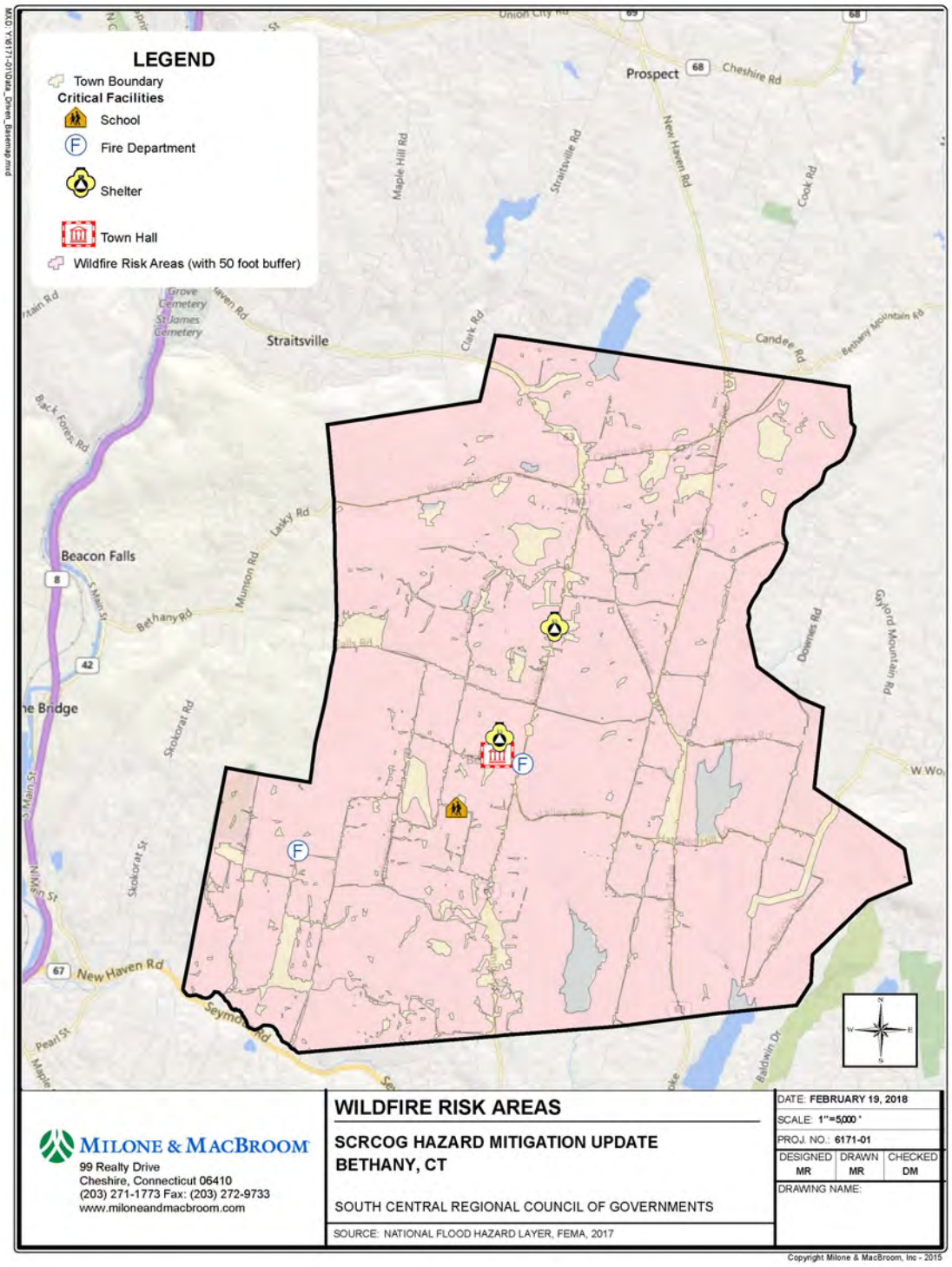


Figure 4-22 Wildfire Map - Bethany

POTENTIAL IMPACTS—BETHANY

Table 4-30 shows the total estimated value of improved parcels (parcels that contain at least one building), critical facilities, and historic assets that intersect with known hazard areas, as an indicator of the potential impacts should a hazard event occur.

Table 4-30 Potential Impacts by Hazard - Bethany[187]

Hazard	Value of At-Risk Parcels[188]	Value of At-Risk Critical Facilities[189]	Value of At-Risk Historic Assets[190]
Extreme Temperatures	$740,089,654	$651,684	$734,936
Hurricane/Tropical Storm	$740,089,654	$651,684	$734,936
Severe Thunderstorm	$740,089,654	$651,684	$734,936
Severe Winter Storm/Nor'easter	$740,089,654	$651,684	$734,936
Tornado	$740,089,654	$651,684	$734,936
Dam Failure			
High Hazard (Class C)	$18,832,423	$0	$0
Significant Hazard[191] (Class B)	N/A	N/A	N/A
Drought	$740,089,654	$651,684	$734,936
Flood[192]			
1-Percent-Annual-Chance	$27,875,749	$0	$0
0.2-Percent-Annual-Chance	$9,279,689	$0	$0
Earthquake	$740,089,654	$651,684	$2,204,808
Wildfire	$722,251,978	$651,684	$734,936

LOSS ESTIMATES—BETHANY

Detailed Hazus-MH Loss Estimates

HAZUS-MH Loss-Estimate results from the current version of the plan are provided side-by-side with the results from previous version of the plan.

[187] Potential Impacts are based on parcel exposure, not building exposure. It is possible for a historic asset or critical facility building to not be exposed, yet its associated parcel intersects a hazard area. The parcel value will then be reflected in the Potential Impacts Table.
[188] Based on estimated exposure values from GIS mapping.
[189] Based on estimated exposure values from GIS mapping.
[190] Based on estimated exposure values from GIS mapping.
[191] Dam failure inundation mapping was available for Class C dams. Inundation mapping was not available for other dams located in the town.
[192] Results for the flood hazard are not cumulative. Numbers and values of assets for events of increasing magnitude should be read as "in addition to" the preceding magnitudes.

Riverine Flood

Estimated building losses for the riverine flood hazard generated by Hazus-MH are broken down into two categories: direct building losses and business interruption losses. The direct building losses are the estimated costs to repair or replace the damage caused to the building and its contents. The business interruption losses are the losses associated with the inability to operate a business because of the damage sustained during the flood. Business interruption losses also include the temporary living expenses for those people displaced from their homes because of the flood (see Table 4-31).

Table 4-31 Riverine Flood Loss Estimates (1-Percent-Annual-Chance Flood) - Bethany

	2014 Results Thousands of Dollars					2017 Results Thousands of Dollars				
	Residential	Commercial	Industrial	Others	Total	Residential	Commercial	Industrial	Others	Total
Direct Building Loss										
Building	$830	$50	$10	$10	$900	$130	$10	$0	$0	$130
Contents	$400	$150	$20	$60	$630	$50	$40	$0	$10	$90
Inventory	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Subtotal	$1,230	$200	$30	$70	$1,530	$170	$50	$0	$10	$230
Business Interruption										
Income	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Relocation	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Rental Income	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Wage	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Subtotal	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
TOTAL	**$1,230**	**$200**	**$30**	**$70**	**$1,530**	**$170**	**$50**	**$0**	**$10**	**$230**

In addition, Hazus estimates two (21 in the previous plan's analysis) households will be displaced due to the flood. Displacement includes households evacuated from within or very near to the inundated area. Of these, zero (7 in the previous analysis) people will seek temporary shelter in public shelters. These inland flooding results show a decrease in the losses from a 1% annual-chance flood between previous and current HAZUS results. It is likely that changes in flood-zone mapping and flood depth calculation methodologies are the primary reasons for those differences.

Hurricane Wind

Hazus-MH was used to model probabilistic hurricane wind impacts for the 10-, 20-, 50-, 100-, 200-, 500- and 1,000-year events. These annualized return periods compare to the Saffir-Simpson Scale in the following way:

- 10-year Tropical Depression/Tropical Storm
- 20-year Tropical Storm
- 50-year Tropical Storm/Category 1

- 100-year Category 1/Category 2
- 200-year Category 2
- 500-year Category 3
- 1000-year Category 3

The number of buildings estimated to be damaged and the resulting building-related economic losses are shown in Table 4-32 and Table 4-33.

Table 4-32 Number of Buildings Damaged – Bethany

	Return Period	Minor	Moderate	Severe	Destruction	Total
2014 Results	10-year	0	0	0	0	0
	20-year	1	0	0	0	1
	50-year	11	0	0	0	11
	100-year	89	5	0	0	94
	200-year	265	29	1	1	296
	500-year	564	128	15	7	714
	1,000-year	741	274	60	32	1,107
2017 Results	10-year	0	0	0	0	0
	20-year	0	0	0	0	0
	50-year	3	0	0	0	3
	100-year	30	1	0	0	31
	200-year	98	5	0	0	103
	500-year	289	30	1	0	320
	1,000-year	472	77	6	2	557

Table 4-33 Buildings-Related Economic Losses - Bethany

	Return Period	Minor	Moderate	Severe	Destruction	Total
2014 Results	10-year	$0	$0	$0	$0	$0
	20-year	$86,000	$0	$0	$0	$86,000
	50-year	$553,610	$17,870	$4,130	$3,500	$579,110
	100-year	$1,789,270	$107,990	$23,580	$22,750	$1,943,590
	200-year	$4,478,950	$411,390	$117,130	$123,730	$5,131,200
	500-year	$15,625,560	$1,471,900	$544,340	$495,150	$18,136,950
	1,000-year	$39,291,860	$3,812,060	$1,472,300	$1,043,550	$45,619,770
2017 Results	10-year	0	0	0	0	0
	20-year	0	0	0	0	0
	50-year	$388,150	$9,000	$2,930	$1,770	$401,840
	100-year	$1,658,080	$47,430	$10,940	$9,840	$1,726,300
	200-year	$3,124,930	$142,410	$31,290	$31,020	$3,329,650
	500-year	$7,722,080	$534,460	$159,500	$163,370	$8,579,420
	1,000-year	$15,593,790	$1,102,840	$389,630	$366,810	$17,453,060

These hurricane wind results show a decrease in the losses from high wind events between previous and current Hazus-MH results. The difference in results is most likely explained by incremental improvements in the Hazus-MH program over the last few years.

Earthquake

An earthquake scenario was developed using Hazus-MH that models a magnitude 6.4 earthquake with an epicenter 10 kilometers below East Haddam, about 30 miles east of the center of the SCRCOG planning are. The number of buildings estimated to be damaged and the resulting building-related economic losses are shown in Table 4-34 and Table 4-35.

Table 4-34 Number of Buildings Damaged - Bethany

	Slight	Moderate	Extensive	Complete	Total
Count	369	148	38	7	562

Table 4-35 Number of Buildings Damaged - Bethany

	Residential	Commercial	Industrial	Others	Total
Losses	$12,890,000	$560,000	$8,110,000	$1,670,000	$24,840,000

Other modeled impacts of this event include:

- Essential Facilities: no damage or loss functionality during or following this event
- Transportation Infrastructure: no damage or loss of functionality following this event
- Utilities:
  - Potable water pipelines: 15 leaks and 4 breaks, a loss of $70,000
  - Wastewater pipelines: 11 leaks and 3 break, a loss of $50,000
  - Natural gas pipelines: 3 leaks and 1 break, a loss of $10,000
  - No loss of service
- Shelter: 1 household will be displaced, with 0 individuals seeking temporary shelter in public shelters
- 0 - 2 individuals may require hospitalization, depending on the time of day the earthquake strikes

It is very important to note that Hazus-MH utilizes default figures for water, wastewater, and natural gas systems in any community. Bethany is largely devoid of these utilities, and therefore the figures above are conservatively high for the town. A more prudent way to use the figures for Bethany is to assume, for example, that the potable water system loss of $70,000 would occur in the small public water systems that exist in the town, and the loss of $50,000 for wastewater systems would occur in the large state-regulated subsurface sewage disposal systems.

ANNUALIZED LOSS ESTIMATES

Table 4-36 shows annualized loss estimates (ALE) for each hazard. Estimates were derived from a number of sources, as described in the Methodology section, and included in column two of the table:

- NFIP: Historic flood insurance claims processed for the community
- PA: Historic Public Assistance grants awarded to the community
- State HMP: Localized estimates based on those presented in the 2014 Connecticut Hazard Mitigation Plan

- HAZUS: Hazus-MH results from modeling performed for this multi-jurisdictional plan
- State HAZUS: Hazus-MH results from modeling performed for the 2014 Connecticut Hazard Mitigation Plan

Hazus-MH results for flooding and earthquake hazards (as run for this multi-jurisdictional plan) were not able to be annualized, and so are not included in the table below.

Table 4-36 Annualized Loss Estimates by Hazard - Bethany

Hazard	Source	Annualized Loss Estimate
Flooding	NFIP	$185
	PA	$6,715
	State HMP	$1,281
Hurricane Wind Thunderstorm	HAZUS	$77,641
	PA	$3,357
	State HMP	$523
Tornado Winter Storm Dam Failure	State HMP	$54,534
	PA	$21,792
	State HMP	$40
	State HMP	$222
Wildfire	State HMP	$12,556
Earthquake	State HAZUS	$10,514

PROBLEM STATEMENTS—BETHANY

Table 4-37 provides statements of particular interest with regard to primary hazards of concern, geographic areas of concern, and vulnerable community assets within the Town of Bethany. If applicable, any noted potential solutions or mitigation actions are discussed with the problem statements.

Table 4-37 Problem Statements – Bethany

Primary Hazards of Concern	
Trees	Tree related hazards are widespread during hurricane/tropical storm and severe winter storm events, particularly downing electrical lines, and when falling and blocking roads that isolate many rural areas throughout town and pose life/safety threat due to a lack of emergency access. Hazardous trees on Town-owned property are also a significant and costly concern. There are many diseased trees that create an additional threat to wires. Eversource is working hard to cut the trees and upgrade the wires. They have created a system to re-route power to the Town Hall if necessary. The Town requests a back-up generator from the State if power is threatened.
Riverine Flooding	Riverine flooding remains a concern despite limited development in the floodplain. Flooding impacts roads due to undersized culverts.
Beavers	Beavers create a potential flooding risk. There is a large beaver dam on private property that can cause flooding on public land.
Drought	Slight concern associated with drought related to the large number of wells across town (no town water supply), though only a few known incidents have occurred.
Dam Failure	The Long Hill Reservoir Dam at New Naugatuck Reservoir could affect the trailer park on northwest side of town.
Geographic Areas of Concern	
Hop Brook Lane/Miller Road	Hop Brook Lane/Miller Road has a culvert that is 72” wide. If the stream floods this

	would impact the most densely populated area of Bethany.
Miller Road Bridge	Miller Road Bridge is deteriorating and needs to be upgraded.
Miller Road	Trees along Miller Road need to be cut-back and cleared. The road is a dead end and if trees cross the road people become isolated. Thirty-forty homes became isolated during Winter Storm Alfred and Hurricane Irene.
Hop Brook Pond Dam	Some flooding associated with this dam has occurred in the past.
Vulnerable Community Assets	
Miller Road	Miller Road has suffered damage/washout in the past due to flooding and a blown culvert (the culvert was replaced to same standard under FEMA Public Assistance – Mitigation under Section 406 deemed too costly).
Shelters	Three possible shelters exist in Bethany. The Elementary School has a generator but it does not power the entire building. The Middle School has a generator that only powers heat and refrigeration it does not power lights. The Old Airport Hangar is becoming a shelter but it currently does not have a generator.
Town Hall	The Town hall does not have a generator. Transfer switches were installed at the Town Hall in 2017. The Town usually borrows a generator from the State when a power outage is imminent.
Laticrete	Laticrete is one of the Town's major employers (approximately 125 employees), along with the schools.

CHANGES/IMPROVEMENTS SINCE 2014

- Bethany is no longer concerned about having to serve as a host to community for evacuees from coastal towns because Ansonia has become the designated location.
- Previously there was a concern about cell towers having back-up power. Verizon added generators so this is no longer an issue.
- The concern for homebound and elderly residents has been abated by Human Services maintaining a list of oxygen dependent people and including this list in their Emergency Operation Center and with the Fire Department.

BRANFORD

CRITICAL FACILITIES – BRANFORD

Table 4-38contains a list of critical facilities provided by the Town of Branford. These are depicted on **Figure 4.10** along with FEMA flood zones.

Table 4-38 Critical Facilities – Branford

Facility	Location	Emergency Power Supply?	Shelter?	In Floodplain or Coastal Flood Hazard Area?	In Surge Zones?
Emergency Services					
Police Department	33 Laurel Street	Yes	No	No	No
Fire Headquarters	45 North Main St.	Yes	For town staff	No	No
Fire House	84 Thimble Isl Rd	Yes	No	No	No
Emergency Operations Center	Police Dept	N/A	N/A	N/A	N/A
Fire House	6 Linden Ave	Yes	No	Yes	No

Facility	Location	Emergency Power Supply?	Shelter?	In Floodplain or Coastal Flood Hazard Area?	In Surge Zones?
Fire House	341 Main St	Yes	No	No	No
Fire House	64 Shore Drive	Yes	No	No	No
Municipal Facilities					
Town Hall	1019 Main St	Yes	No	No	No
Counseling Center	342 Harbor St	No	No	No	No
Public Works	137 No Branford Rd	Yes	No	No	No
Willoughby Wallace Library	146 Thimble Island Road	No	No	No	No
Tisko School	118 Damascus Rd	No	No	No	No
Sliney School	23 Eades Street	No	No	No	No
Walsh Middle School	185 Damascus Rd	No	No	No	No
Shelters					
Community House	46 Church St	Yes	Yes	Yes	No
Branford High School	185 East Main St	Yes	Yes	No	No
Murphy School	8 Brushy Plain Rd	Yes	Yes	No	No
Water and Wastewater					
Pumping Stations	51 pump stations	Most	No	Some	No
Treatment Plant	75 Block Isl. Rd	Yes	No	Yes	No
Health Care and Senior Living Facilities					
Connecticut Hospice	100 Double Beach Road	Yes	No	No	No
Branford Hills Health Center	189 Alps Road	Yes	No	No	No
Hearth at Gardenside	173 Alps Road	Yes	No	No	No
Cedar Woods	80 Cedar Street	Yes	No	No	No
Green View Apts	Hillside Avenue	No	No	No	No
Rose Street Apts	Rose Street	No	No	No	No
Rice Terrace Apts	Rice Terrace	No	No	No	No
Artis Memory Care	814 East Main St	Yes	No	No	No
Housing Authority	115 South Montowese St	Yes	No	No	No
Housing Authority	3 Block Island Rd	Yes	No	Yes	No
Other Infrastructure and Facilities					
Substation	272 East Main	No	No	No	No
Army Reserve Center	777 East Main St	Yes	No	No	No
State Armory	83 Montowese St	unknown	No	No	No

VULNERABLE ASSETS—BRANFORD

Vulnerable assets were identified by intersecting GIS-based asset inventories and demographic data with known hazard boundaries to determine the number of parcels, buildings, critical facilities, historic assets, and populations exposed to each hazard. This results in an estimation of vulnerable assets by hazard as shown in **Historic** Resources Map - Branford

Table 4-39. **Figure 4-23** depicts the locations of critical facilities and **Figure 4-24** depicts the locations of historic resources.

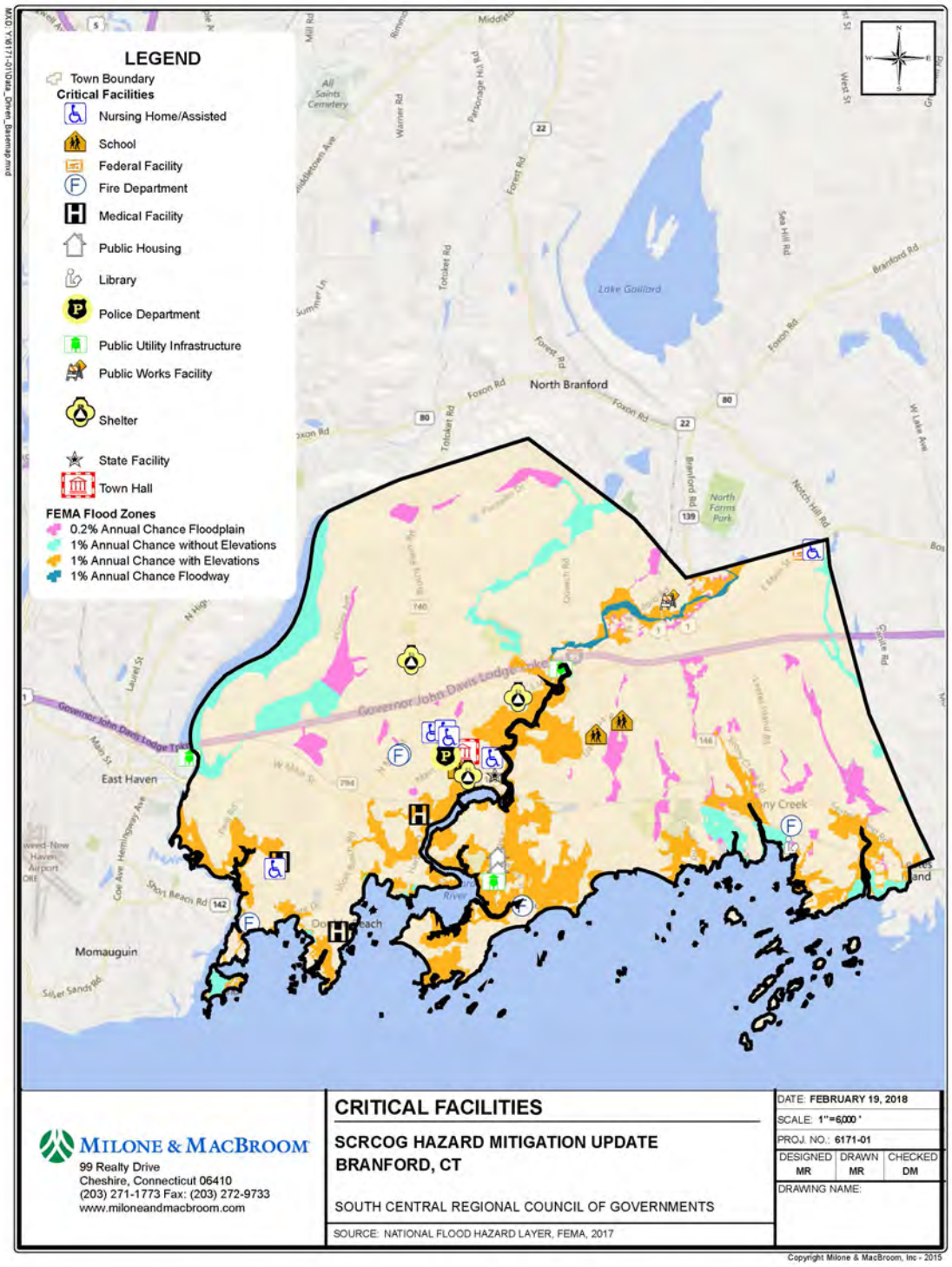


Figure 4-23 Critical Facilities and SFHA Map - Branford

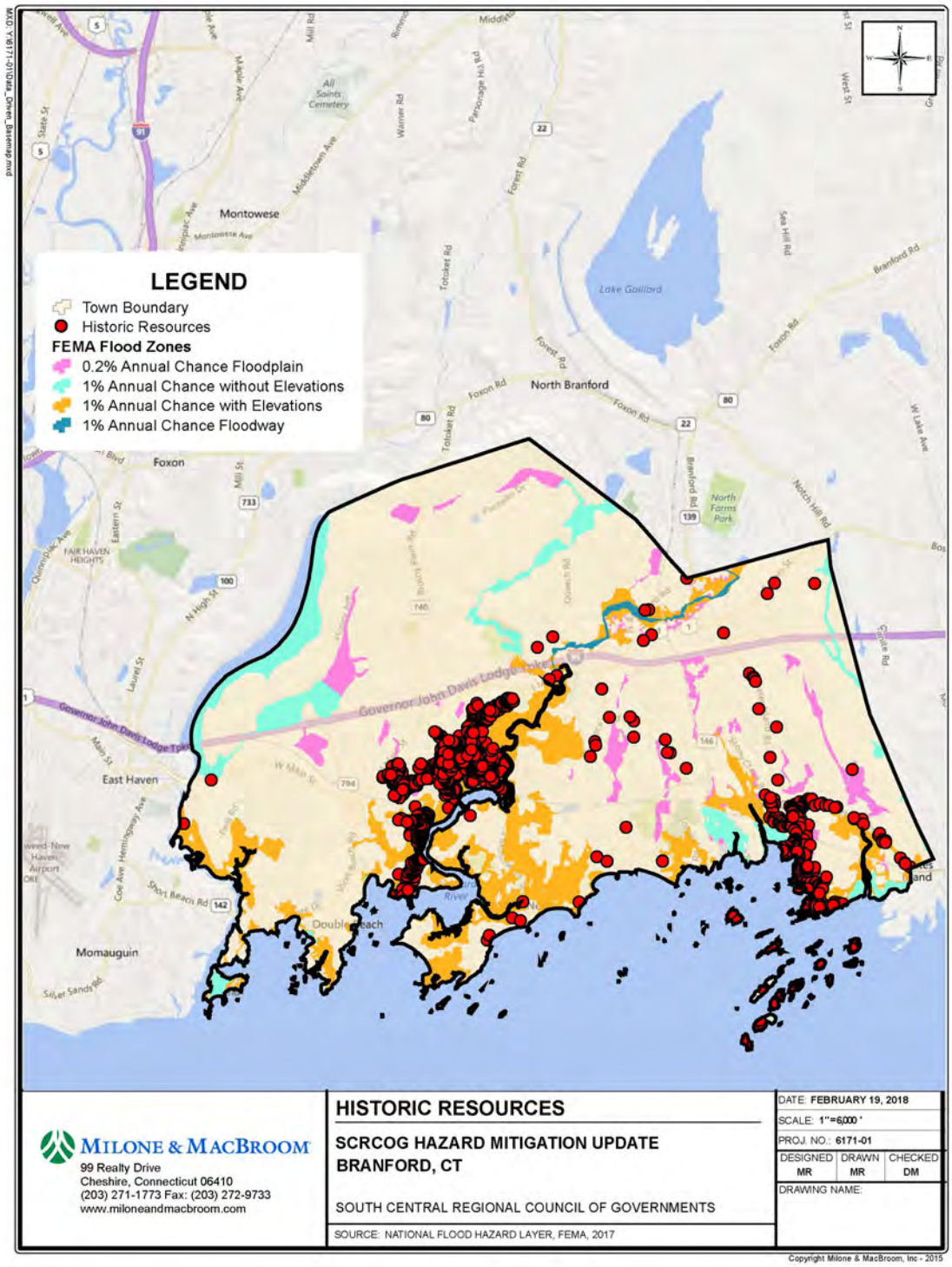


Figure 4-24 Historic Resources Map - Branford

Table 4-39 Vulnerable Assets by Hazard – Branford

Hazard	Number of Parcels[193]	Number of Buildings[194]	Critical Facilities[195]	Historic Assets[196]	Population[197]
Extreme Temperatures	13,078	11,785	32	1771	5,381
Hurricane/Tropical Storm	13,078	11,785	32	1771	28,026
Severe Thunderstorm	13,078	11,785	32	1771	28,026
Severe Winter Storm/Nor'easter	13,078	11,785	32	1771	28,026
Tornado	13,078	11,785	32	1771	28,026
Coastal Erosion[198]	211	224	0	19	450
Dam Failure					
High Hazard (Class C)	3,399	2,400	11	547	4,824
Significant Hazard[199] (Class B)	14	6	0	0	12
Drought	13,078	11,785	32	1771	28,026
Flood[200]					
1-Percent-Annual-Chance	2835	1,605	4	266	3,226
0.2-Percent-Annual-Chance	346	66	2	14	133
Zone VE	834	247	0	69	496
Category 1 Storm Surge	3,276	855	0	157	1,719
Category 2 Storm Surge	3,832	1,543	3	150	3,101
Category 3 Storm Surge	2,993	1,496	4	181	3,007
Category 4 Storm Surge	2,972	1,559	4	166	3,134
Sea Level Rise	1,471	1,890	0	88	3,799
Earthquake	13,078	11,785	32	1771	28,026
Wildfire	2,142	1,078	0	28	2,167

REPETITIVE LOSS AND SEVERE REPETITIVE LOSS PROPERTIES

In addition to the spatial analysis conducted above, summary information for repetitive flood loss and severe repetitive flood loss properties within the Town of Branford also provides an indication of vulnerable assets, especially with regard to properties insured under the National Flood Insurance Program that have experienced repeated flooding (see Table 4-40).[201]

[193] Based on data provided by the Town of Branford.
[194] Based on building numbers from 2010 census data.
[195] Based on data provided by the Town of Branford.
[196] Based on data provided by the Town of Branford.
[197] Based on population numbers from 2010 census data.
[198] Coastal Erosion Hazard determined using Analysis of Shoreline Change in Connecticut - published by DEEP, Sea Grant, and UConn/CLEAR
[199] Dam failure inundation mapping was available for Class C dams. Inundation mapping was not available for other dams located in the town.
[200] Results for the flood hazard are not cumulative. Numbers and values of assets for events of increasing magnitude should be read as "in addition to" the preceding magnitudes.
[201] Based on information provided by the Federal Emergency Management Agency current as of 12/31/2012.

Table 4-40 Repetitive Flood Loss and Severe Repetitive Flood Loss Summary - Branford

	Number of Losses	Number of Properties	Building Payments	Contents Payments	Total Payments
Repetitive Loss	296	125	$7,288,348	$871,110	$8,159,458
Severe Repetitive Loss	15	2	$283,138	$6702	$289,840

The majority of the RL properties are single-family homes. Six are residential condominium units and three are multi-family homes. Only three RL properties are non-residential, and these appear to be commercial and industrial uses.

As of December 31, 2012, the Town of Branford had a total of 726 claims totaling $8,210,900 in losses for all NFIP-insured structures. By July 31, 2017, that number had increased to 736 claims, totaling $12,428,875.

Figure 4-25 through **Figure 4-28** show dam failure, storm surge, sea level rise, and wildfire hazard areas within the Town of Branford.

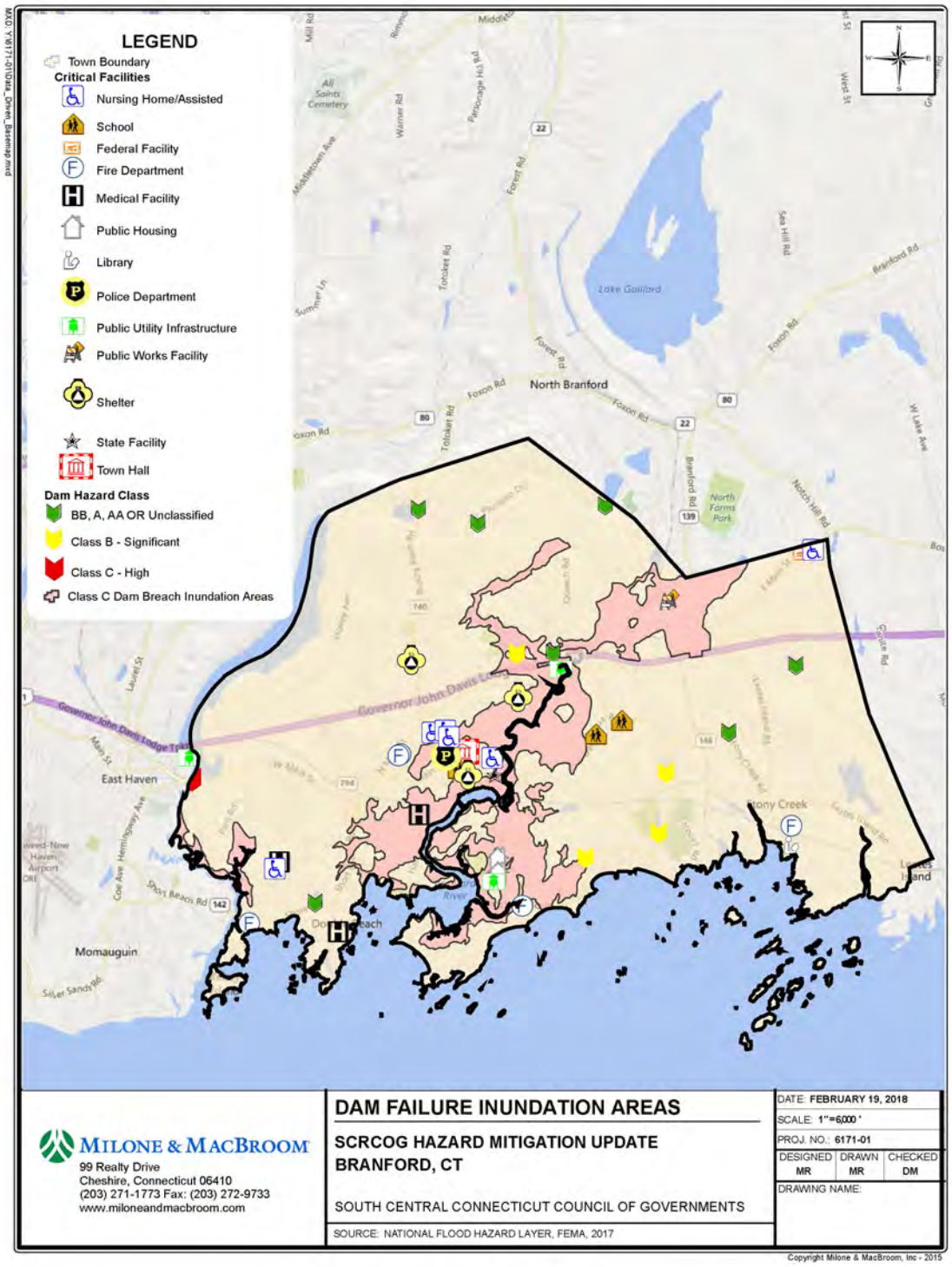


Figure 4-25 Dams - Branford

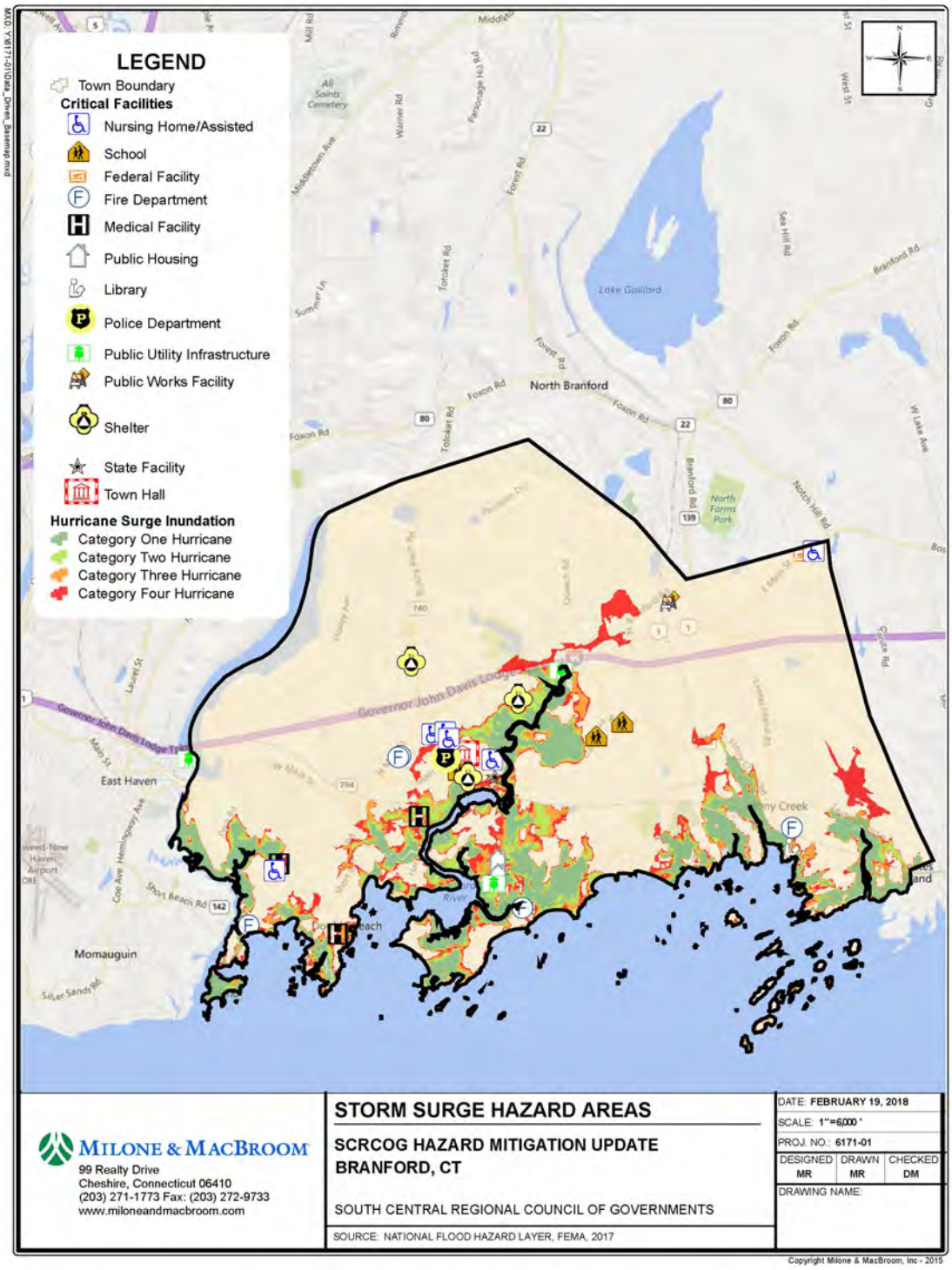


Figure 4-26 Hurricane Inundation Map - Branford

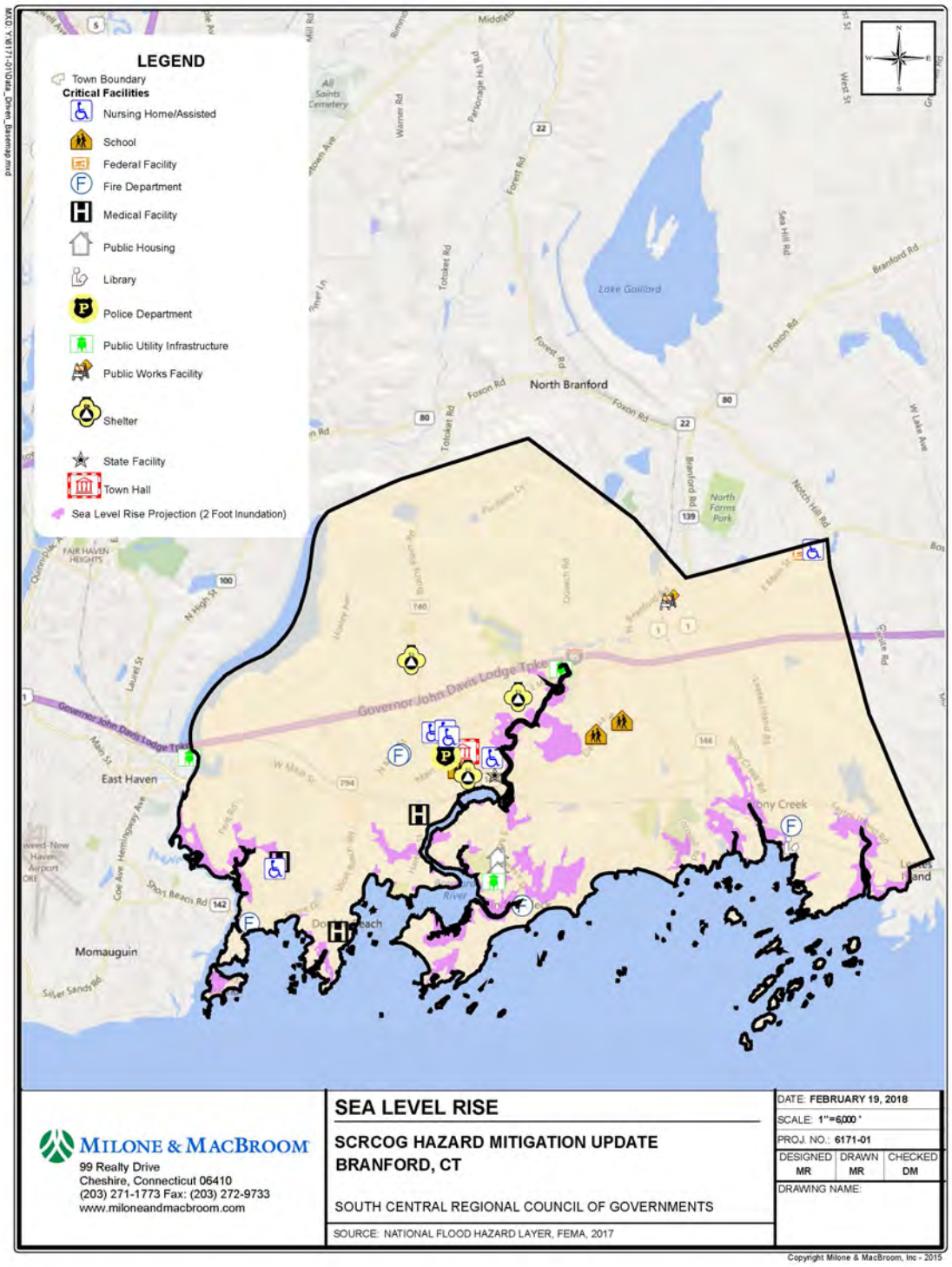


Figure 4-27 Sea Level Rise - Branford

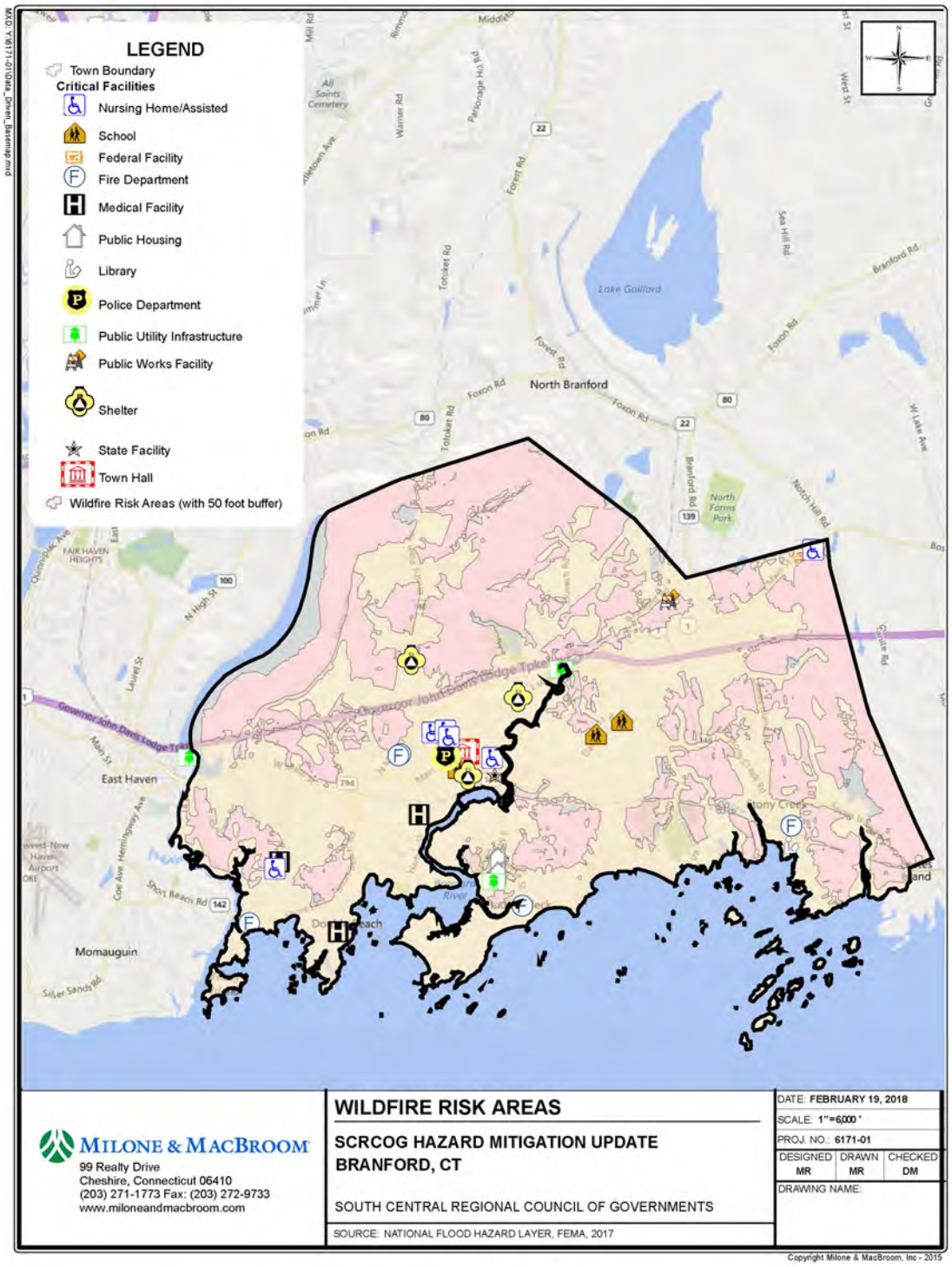


Figure 4-28 Wildfire Map - Branford

POTENTIAL IMPACTS—BRANFORD

Table 4-41 shows the total estimated value of improved parcels (parcels that contain at least one building), critical facilities, and historic assets that intersect with known hazard areas, as an indicator of the potential impacts should a hazard event occur.

Table 4-41 Potential Impacts by Hazard - Branford[202]

Hazard	Value of At-Risk Parcels[203]	Value of At-Risk Critical Facilities[204]	Value of At-Risk Historic Assets[205]
Extreme Temperatures	$4,917,367,950	$275,792,100	$532,081,690
Hurricane/Tropical Storm	$4,917,367,950	$275,792,100	$532,081,690
Severe Thunderstorm	$4,917,367,950	$275,792,100	$532,081,690
Severe Winter Storm/Nor'easter	$4,917,367,950	$275,792,100	$532,081,690
Tornado	$4,917,367,950	$275,792,100	$532,081,690
Coastal Erosion[206]	$196,428,700	$130,500	$37,665,700
Dam Failure			
High Hazard (Class C)	$857,624,560	$103,847,200	$139,163,140
Significant Hazard[207] (Class B)	$3,931,000	N/A	N/A
Drought	$4,917,367,950	$275,792,100	$532,081,690
Flood[208][209]			
1-Percent-Annual-Chance	$1,045,251,020	$148,723,400	$172,636,060
0.2-Percent-Annual-Chance	$258,670,930	$71,968,300	$20,801,400
Zone VE	$591,524,270	$22,742,600	$142,198,200
Category 1 Storm Surge	$1,135,055,710	$138,436,700	$210,766,440
Category 2 Storm Surge	$1,233,328,170	$164,048,000	$254,122,060
Category 3 Storm Surge	$1,190,438,740	$168,356,500	$275,538,140
Category 4 Storm Surge	$1,138,770,310	$170,910,600	$265,034,720
Sea Level Rise	$845,779,910	$69,807,100	$151,378,740
Earthquake	$4,917,367,950	$275,792,100	$532,081,690
Wildfire	$954,523,550	$80,678,800	$29,334,990

[202] Potential Impacts are based on parcel exposure, not building exposure. It is possible for a historic asset or critical facility building to not be exposed, yet its associated parcel intersects a hazard area. The parcel value will then be reflected in the Potential Impacts Table.
[203] Based on data provided by the Town of Branford.
[204] Based on data provided by the Town of Branford.
[205] Based on data provided by the Town of Branford.
[206] Coastal Erosion Hazard determined using Analysis of Shoreline Change in Connecticut - published by DEEP, Sea Grant, and UConn/CLEAR
[207] Dam failure inundation mapping was available for Class C dams. Inundation mapping was not available for other dams located in the town.
[208] Results for the flood hazard are not cumulative. Numbers and values of assets for events of increasing magnitude should be read as "in addition to" the preceding magnitudes.
[209] Results for the hurricane inundation areas are cumulative. Numbers and values of assets for events of increasing magnitude should be read as "consisting of" the preceding magnitudes.

LOSS ESTIMATES—BRANFORD

DETAILED HAZUS-MH LOSS ESTIMATES

Riverine Flood

Estimated building losses for the riverine flood hazard generated by Hazus-MH are broken down into two categories: direct building losses and business interruption losses. The direct building losses are the estimated costs to repair or replace the damage caused to the building and its contents. The business interruption losses are the losses associated with the inability to operate a business because of the damage sustained during the flood. Business interruption losses also include the temporary living expenses for those people displaced from their homes because of the flood (see **Table 4-42**).

Table 4-42 Riverine Flood Loss Estimates (1-Percent-Annual-Chance Flood) - Branford

	2014 Results Millions of Dollars					2017 Results Millions of Dollars				
	Residential	Commercial	Industrial	Others	Total	Residential	Commercial	Industrial	Others	Total
Direct Building Loss										
Building	$46.43	$10.66	$4.03	$1.34	$62.46	$2.03	$2.55	$1.43	$0.10	$6.11
Contents	$29.77	$28.11	$7.94	$7.89	$73.71	$1.07	$7.16	$2.87	$0.75	$11.84
Inventory	$0	$0.44	$1.45	$0.09	$1.98	$0	$0.10	$0.46	$0.01	$0.56
Subtotal	**$76.20**	**$39.21**	**$13.42**	**$9.32**	**$138.15**	**$3.10**	**$9.80**	**$4.75**	**$0.85**	**$18.51**
Business Interruption										
Income	$0	$0.15	$0	$0.01	$0.16	$0	$0.05	$0	$0	$0.05
Relocation	$0.07	$0.03	$0	$0	$0.10	$0	$0	$0	$0	$0
Rental Income	$0.03	$0.01	$0	$0	$0.04	$0	$0	$0	$0	$0.01
Wage	$0.01	$0.13	$0	$0.07	$0.20	$0	$0.04	$0	$0.01	$0.05
Subtotal	**$0.11**	**$0.32**	**$0**	**$0.08**	**$0.50**	**$0.01**	**$0.09**	**$0**	**$0.01**	**$0.11**
TOTAL	**$76.31**	**$39.53**	**$13.42**	**$9.41**	**$138.65**	**$3.11**	**$9.89**	**$4.75**	**$0.86**	**$18.62**

In addition, the Hazus-MH model estimates 61 (1,324 in the previous plan's analysis) households will be displaced due to the flood. Displacement includes households evacuated from within or very near to the inundated area. Of these, 125 (3,295 in the previous plan's analysis) individuals will seek temporary shelter in public shelters.

These inland flooding results show a decrease in the estimated losses from a 1% annual-chance flood between the previous and the current Hazus-MH results. It is likely that the change in the definitions of inland and coastal flood zones is the primary reason for those differences; in fact, while the inland flood damage estimates listed above have decreased since the previous Plan, coastal flood damage estimates (provided in the next section) have increased very significantly.

Coastal Flood

Estimated building losses for the coastal flood hazard generated by Hazus-MH are broken down into two categories: direct building losses and business interruption losses. The direct building losses are the estimated costs to repair or replace the damage caused to the building and its contents. The business interruption losses are the losses associated with the inability to operate a business because of the damage sustained during the flood. Business interruption losses also include the temporary living expenses for those people displaced from their homes because of the flood (see **Table 4-43**).

Table 4-43 Coastal Flood Loss Estimates (100-year Event) - Branford

	2014 Results Millions of Dollars					2017 Results Millions of Dollars				
	Residential	Commercial	Industrial	Others	Total	Residential	Commercial	Industrial	Others	Total
Direct Building Loss										
Building	$6.84	$0.72	$0.09	$0.02	$7.67	$145.84	$21.89	$7.89	$2.63	$178.32
Contents	$4.25	$1.76	$0.21	$0.16	$6.38	$118.04	$62.33	$18.93	$14.51	$213.81
Inventory	$0	$0.02	$0.01	$0	$0.03	$0	$0.71	$1.95	$0.18	$2.83
Subtotal	**$11.09**	**$2.50**	**$0.31**	**$0.18**	**$14.08**	**$263.88**	**$84.93**	**$28.84**	**$17.32**	**$394.96**
Business Interruption										
Income	$0	$0.01	$0	$0	$0.01	$0	$0.26	$0	$0.02	$0.28
Relocation	$0.01	$0	$0	$0	$0.01	$0.24	$0.03	$0	$0.01	$0.27
Rental Income	$0	$0	$0	$0	$0	$0.05	$0.01	$0	$0	$0.07
Wage	$0	$0.01	$0	$0	$0.01	$0	$0.27	$0	$0.16	$0.43
Subtotal	**$0.01**	**$0.02**	**$0**	**$0**	**$0.03**	**$0.29**	**$0.57**	**$0**	**$0.18**	**$1.04**
TOTAL	**$11.10**	**$2.52**	**$0.31**	**$0.18**	**$14.11**	**$264.16**	**$85.49**	**$0**	**$28.84**	**$396.00**

In addition, the Hazus-MH model estimates 1,769 households will be displaced due to the flood. Displacement includes households evacuated from within or very near to the inundated area. 4,669 individuals will seek temporary shelter in public shelters.

These coastal flooding results show a very significant increase in the estimated losses from a 1% annual-chance flood between the previous and the current Hazus-MH results. It is likely that the change in the definitions of inland and coastal flood zones is the primary reason for those differences; in fact, while the coastal flood damage estimates listed above have increased since the previous Plan, inland flood damage estimates (provided in the previous section) have decreased very significantly.

Hurricane Wind

Hazus-MH was used to model probabilistic hurricane wind impacts for the 10-, 20-, 50-, 100-, 200-, 500- and 1,000-year events. These annualized return periods compare to the Saffir-Simpson Scale in the following way:

- 10-year Tropical Depression/Tropical Storm
- 20-year Tropical Storm

- 50-year Tropical Storm/Category 1
- 100-year Category 1/Category 2
- 200-year Category 2
- 500-year Category 3
- 1000-year Category 3

The number of buildings estimated to be damaged and the resulting building-related economic losses are shown in **Table 4-44** and **Table 4-45**.

Table 4-44 Number of Buildings Damaged - Branford

	Return Period	Minor	Moderate	Severe	Destruction	Total
2014 Results	10-year	0	0	0	0	0
	20-year	14	1	0	0	15
	50-year	292	27	1	0	320
	100-year	1,252	187	8	3	1,450
	200-year	2,746	704	59	29	3,538
	500-year	4,125	1,924	390	221	6,660
	1,000-year	4,207	2,949	1,000	622	8,778
2017 Results	10-year	0	0	0	0	0
	20-year	10	0	0	0	10
	50-year	117	8	0	0	125
	100-year	560	66	2	0	628
	200-year	1,418	234	10	4	1,666
	500-year	2,767	750	67	34	3,618
	1,000-year	3,582	1,330	195	106	5,213

Table 4-45 Building-Related Economic Losses - Branford

	Return Period	Minor	Moderate	Severe	Destruction	Total
2014 Results	10-year	$0	$0	$0	$0	$0
	20-year	$764,860	$54,770	$18,390	$6,740	$844,760
	50-year	$10,250,950	$486,990	$113,250	$51,550	$10,902,740
	100-year	$30,135,430	$2,735,800	$905,000	$453,420	$34,229,650
	200-year	$83,693,110	$11,651,510	$4,993,450	$1,863,840	$102,201,910
	500-year	$269,725,490	$42,195,060	$17,468,280	$5,816,860	$335,205,690
	1,000-year	$554,913,270	$107,536,680	$39,730,270	$12,870,080	$715,050,300
2017 Results	10-year	$0	$0	$0	$0	$0
	20-year	$805,720	$0	$0	$0	$805,720
	50-year	$11,827,320	$242,250	$50,370	$29,620	$12,149,550
	100-year	$31,457,140	$1,360,360	$362,540	$194,970	$33,375,010
	200-year	$65,007,460	$4,982,660	$1,797,030	$839,990	$72,627,140
	500-year	$154,901,280	$16,059,170	$6,840,600	$2,617,720	$180,418,770
	1,000-year	$278,124,270	$32,430,910	$14,097,590	$4,891,840	$329,544,610

Table 4-46 Other Hurricane Impacts - Branford

	Return Period	Debris Generated (Tons)	Households Displaced	Individuals Seeking Temporary Shelter
2014 Results	10-year	0	0	0
	20-year	693	0	0
	50-year	3,611	1	0
	100-year	10,320	21	5
	200-year	20,361	67	15
	500-year	38,619	205	42
	1,000-year	57,507	408	84

Other modeled impacts as referenced in **Table 4-46** of this event include the following effects on essential facilities:

- After a 200-year hurricane: 0 of 52 hospital beds are available on the day of the event. After one week, all 52 beds are operational.
- After a 500-year hurricane: One hospital will likely experience moderate damage. 0 of 52 hospital beds are available on the day of the event. After one week, all 52 beds are operational. All 9 schools are expected to lose at least one day of use.
- After a 1,000-year hurricane: One hospital and one school will likely experience moderate damage. 0 of 52 hospital beds are available more than one week after the event. After 30 days, all 52 beds are operational. All 9 schools are expected to lose at least one day of use.

These hurricane wind results show a decrease in the losses from high wind events between previous and current Hazus-MH results. The difference in results is most likely explained by incremental improvements in the Hazus-MH program over the last few years.

Earthquake

An earthquake scenario was developed using Hazus-MH that models a magnitude 6.4 earthquake with an epicenter 10 kilometers below East Haddam. The number of buildings estimated to be damaged and the resulting building-related economic losses are shown in **Table 4-47 and Table 4-48.**

Table 4-47 Number of Buildings Damaged - Branford

	Slight	Moderate	Extensive	Complete	Total
Count	2,301	1,040	349	103	1,492

Table 4-48 Building-Related Economic Losses – Branford

	Residential	Commercial	Industrial	Others	Total
Losses	$116,870,000	$162,140,000	$48,120,000	$16,480,000	$343,610,000

Other modeled impacts of this event include:

- Essential Facilities:
  - No essential facilities experience more than 50% damage
  - Following the event, the functionality of essential facilities is as follows:
    - Hospital: 49% after one day, 71% after one week, and 91% after 30 days
    - Schools: Zero of nine are more than 50% functional the day after the event
    - Police Stations: zero of two are more than 50% functional the day after the event
    - Fire Stations: Zero of one are more than 50% functional the day after the event
- Transportation Infrastructure:
  - Only 17 of 25 highway segments are more than 50% functional after one week
  - Two highway bridges experiences at least moderate damage, and one of 28 highway bridges will be less than 50% functional the first day after the event; highway losses will equal $19.72 million
  - One light rail segment is less than 50% functional for more than one week; damages to facilities equal $390,000.
- Utilities:
  - Potable water: 123 pipeline leaks and 31 breaks. Total losses are $560,000
  - Wastewater: Less than 50% functionality the day after the event. 88 pipeline leaks and 22 breaks. Total losses are $5.94 million
  - Natural gas: 25 pipeline leaks and 6 breaks, a loss of $110,000
  - Electric: damages to facilities equal $9.80 million
  - 4 households without water service on day one. Full service by day 3.
- Shelter: 290 household will be displaced, with 128 individuals seeking temporary shelter in public shelters
- 7 to 30 individuals may require hospitalization and an additional 1 to 7 individuals may be killed, depending on the time of day the earthquake strikes

ANNUALIZED LOSS ESTIMATES

Table 4-49 shows annualized loss estimates (ALE) for each hazard. Estimates were derived from a number of sources, as described in the Methodology section, and included in column two of the table:

- NFIP: Historic flood insurance claims processed for the community
- PA: Historic Public Assistance grants awarded to the community
- State HMP: Localized estimates based on those presented in the 2014 Connecticut Hazard Mitigation Plan
- HAZUS: Hazus-MH results from modeling performed for this multi-jurisdictional plan
- State HAZUS: Hazus-MH results from modeling performed for the 2014 Connecticut Hazard Mitigation Plan

Hazus-MH results for flooding and earthquake hazards (as run for this multi-jurisdictional plan) were not able to be annualized, and so are not included in the table below.

Table 4-49 Annualized Loss Estimates by Hazard - Branford

Hazard	Source	Annualized Loss Estimate
Flooding	NFIP	$318,169
	PA	$165,811
	State HMP	$6,452
Hurricane Wind Thunderstorm	HAZUS	$1,671,235
	PA	$82,906
	State HMP	$2,633
Tornado Winter Storm Dam Failure	State HMP	$274,739
	PA	$38,888
	State HMP	$204
	State HMP	$1,120
Wildfire	State HMP	$13,154
Earthquake	State HAZUS	$52,969

PROBLEM STATEMENTS—BRANFORD

Table 4-50 provides statements of particular interest with regard to primary hazards of concern, geographic areas of concern, and vulnerable community assets within the Town of Branford. If applicable, any noted potential solutions or mitigation actions are discussed with the problem statements.

Table 4-50 Problem Statements – Branford

Primary Hazards of Concern	
Trees	Tree related hazards are among the Town's most significant recurring and widespread issues, particularly the downing of electric and communication lines during hurricane/tropical storm and severe winter storm events. Potential solutions/mitigation actions: • Coordinate with local businesses to acquire backup generators so they can stay open following hazard events. • Prioritize areas for power restoration through the development of microgrid distributed energy generation. Conduct a survey and develop an inventory of hazard trees, and prepare a long-term maintenance plan for trees owned by the Town.
Coastal Flooding, Coastal Erosion, Sea Level Rise	These hazards may cause salt water intrusion into wells, about 10% of residents have private wells which may be impacted by salt water during floods. Septic systems also become flooded, especially on Stony Creek, because of flooding.
Inland Flooding	Coastal and inland flooding of roadways in low-lying areas throughout town, resulting in potential isolation of numerous properties.
Wildfire	Moderate concerns with wildfire exist due to the large amount of open space and potential for ignitions to occur along railways.

Dam Failure	Failure of the Lake Gaillard Dam would cause severe downstream flooding in Branford.
Geographic Areas of Concern	
Hickory Road, Burban Drive, Tabor Drive, Beckett Avenue, Meadow Street, Sunset Beach, Riverside Drive, Summer Island Road, Waverly Park Area, Thimble Island Road, Shore Drive (Route 142), Limewood Avenue (146), Island View Avenue, Club Parkway, School Ground Road	Drainage in some low-lying areas is deemed very inadequate, resulting in some frequent but temporary roadway flooding. Access to these low-lying areas which become isolated following flood events remains a significant concern for the Town. Potential solutions/mitigation actions: • Elevating roadways. • Stormwater drainage improvements (upgrades underway for Hickory Road). Flood gates (Beckett Avenue).
Linden Avenue	Linden Avenue is an area of significant concern for coastal flooding and coastal erosion. The existing revetment has been damaged and repaired multiple times. A separate taxing district was created to assist with erosion control.
Eastern Section of Route 146	This area of road floods. A study is underway with Guilford and SCRCOG to determine solutions for flooding in this area.
Waverly Park	Waverly Park is residential area that is prone to flooding. The town may consider acquiring some homes in this area in the future.
Offshore Islands	Approximately 100 homes are located on offshore islands (mostly second "summer" homes).
Vulnerable Community Assets	
Water Treatment Plant	The water treatment plant is in an area that becomes isolated following flood events (the facility is protected to a base flood elevation (BFE) for a 1 percent annual chance event).
Pump Stations	Numerous pump stations do not have backup generators (estimated that 25 out of 50 stations are below BFE and considered vulnerable to flooding). Since the previous plan a flood risk analysis has been conducted for each pump station and some have been elevated and some now have generators.
Shelters	Branford High School is a shelter that is in a potential storm surge inundation area.
The Connecticut Hospice	The Connecticut Hospice (100 Double Beach Road) is in a coastal flood hazard area. The facility has large windows with no storm shutters. This facility now has a generator and a remote hookup for a mobile generator.
1 fire station	1 fire station is in the 1-percent-annual-chance floodplain.
Businesses along Commercial Street and Route 139 in north side of town	A large concentration of businesses is located along Commercial Street and Route 139 on the north side of town. This area is deemed potentially vulnerable to flooding of the nearby Branford River. Updated FEMA maps have removed some buildings from Commercial Street from the flood zone.

CHANGES/IMPROVEMENTS SINCE 2014

- The issue of cellular towers not having back-up power has been resolved by the installation of back-up generators.

EAST HAVEN

CRITICAL FACILITIES – EAST HAVEN

Table 4-51 contains a list of critical facilities provided by the Town of East Haven. These are depicted on **Figure 4.16** along with FEMA flood zones.

Table 4-51 Critical Facilities – East Haven

Facility	Location	Emergency Power Supply?	Shelter?	In Floodplain or Coastal Flood Hazard Area?	In Surge Zones?
Emergency Services					
Police Station	471 North High Street	Yes	No	Yes	No
Fire Headquarters	200 Main Street	Yes	No	No	No
Foxon Fire Station	1420 North High Street	Yes	Yes	No	No
Bradford Manor Station	85 George Street	Yes	Yes	No	No
Riverside Fire Station	82 Short Beach Road	Yes	No	No	No
Emergency Radio Infrastructure	111 South Shore Road	N/A	N/A	N/A	N/A
Emergency Radio Infrastructure	Saltonstall Mountain	N/A	N/A	N/A	N/A
Telecommunications station	471 North High Street	Yes	No	No	No
Municipal Facilities					
Town Hall	250 Main Street	No	No	No	No
DPW Facility	461 North High Street	Yes	No	Yes	No
Shelters					
East Haven Senior Center	91 Taylor Ave	Yes	Yes	No	Cat. 4
East Haven High School	35 Wheelbarrow Lane	Yes	Yes	No	No
Health Care and Senior Living Facilities					
The Village at Mariner's Point (senior living)	111 South Shore Drive	Yes	No	No	No
Woodview Elderly Housing (senior living)	1270 North High Street	Limited	No	No	No
Talmadge Park Health Care (nursing home)	38 Talmadge Avenue	Yes	No	No	Cat. 3
Laurel Woods Convalescent Home	451 N High S	Yes	No	No	No
Stewart Rest Home (nursing home)	93 High Street	Yes	No	No	No
Caroline Manor (nursing home)	37 Clark Avenue	Yes	No	No	No
Water and Wastewater					
Sewer pumping stations	Various	Yes	No	Yes	Various
Lake Saltonstall Water Treatment Plant	Main Street	Yes	No	No	No
Other Infrastructure and Facilities					
Tweed-New Haven	155 Burr St. (New	Yes	No	Yes	Cat. 1

Facility	Location	Emergency Power Supply?	Shelter?	In Floodplain or Coastal Flood Hazard Area?	In Surge Zones?
Regional Airport	Haven)				
North High Street underpass at I-95	North High Street	NA	NA	No	No
Laurel Street underpass at I-95	Lauren Street	NA	NA	No	No
Frontage Road underpass at I-95	Frontage Road	NA	NA	No	No

VULNERABLE ASSETS—EAST HAVEN

Vulnerable assets were identified by intersecting GIS-based asset inventories and demographic data with known hazard boundaries to determine the number of parcels, buildings, critical facilities, historic assets, and populations exposed to each hazard. This results in an estimation of vulnerable assets by hazard as shown in **Table 4-52.** **Figure 4-29** depicts the locations of critical facilities in East Haven and **Figure 4-30** depicts the locations of historic resources.

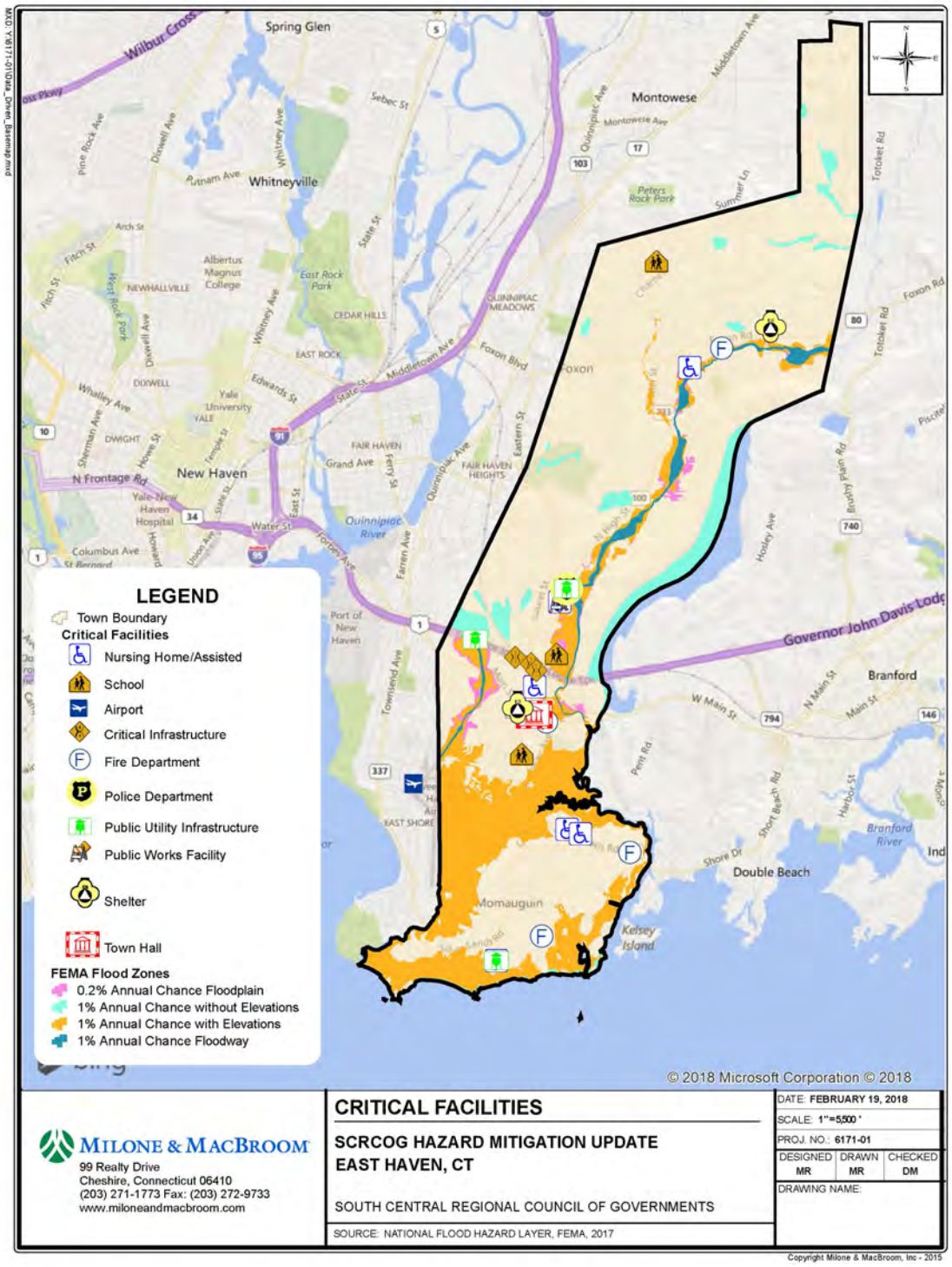


Figure 4-29 Critical Facilities and SFHA Map – East Haven

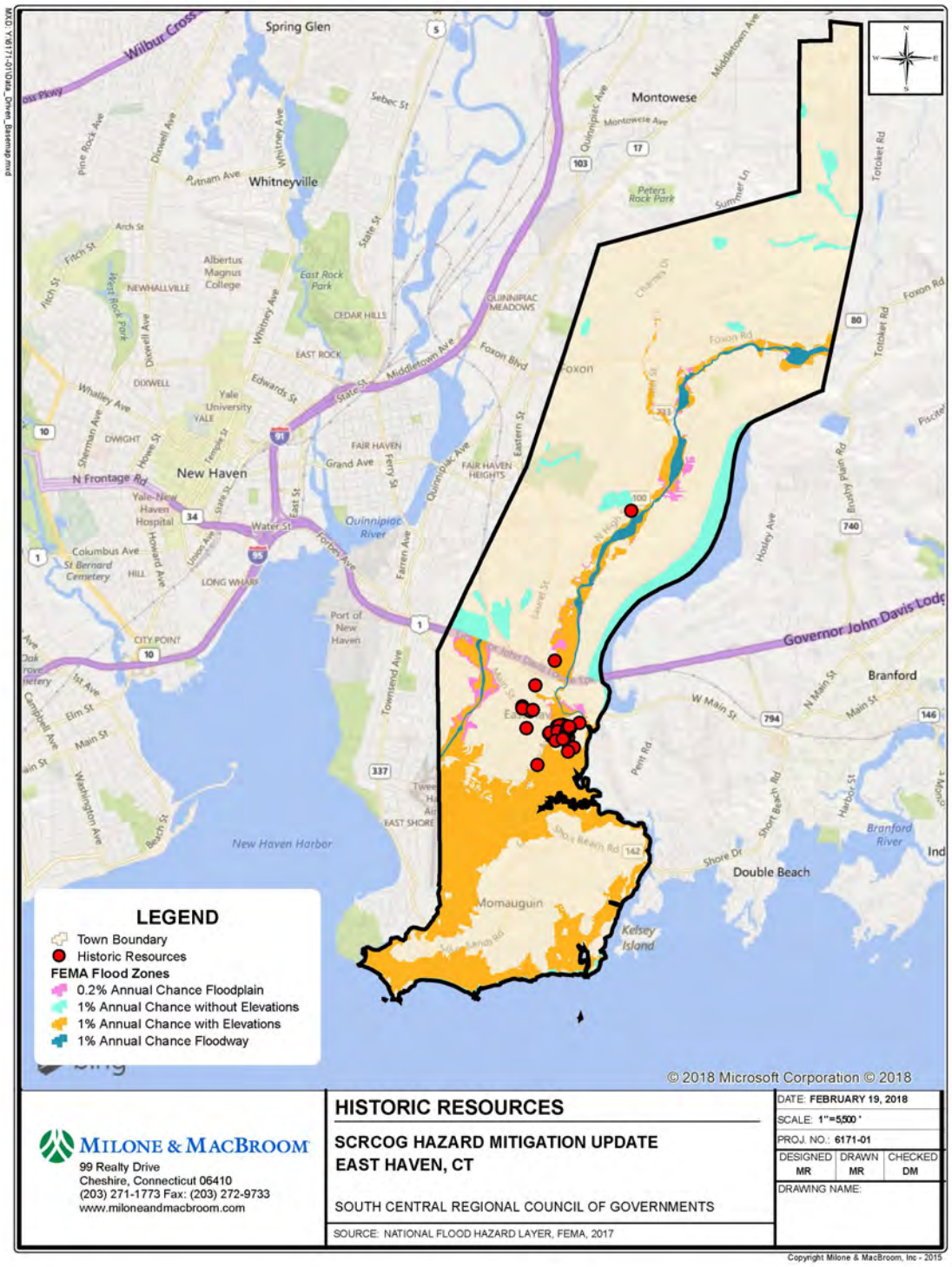


Figure 4-30 Historic Resources Map – East Haven

Table 4-52 Vulnerable Assets by Hazard - East Haven

Hazard	Number of Parcels[210]	Number of Buildings[211]	Critical Facilities[212]	Historic Assets[213]	Population[214]
Extreme Temperatures	11,308	11,881	23	49	5,141
Hurricane/Tropical Storm	11,308	11,881	23	49	28,807
Severe Thunderstorm	11,308	11,881	23	49	28,807
Severe Winter Storm/Nor'easter	11,308	11,881	23	49	28,807
Tornado	11,308	11,881	23	49	28,807
Coastal Erosion[215]	105	99	0	0	231
Dam Failure					
High Hazard (Class C)	156	61	0	0	142
Significant Hazard[216] (Class B)	N/A	N/A	N/A	N/A	N/A
Drought	11,308	11,881	23	49	28,807
Flood[217]					
1-Percent-Annual-Chance	2,623	1,603	1	2	3,735
0.2-Percent-Annual-Chance	493	262	1	1	610
Zone VE	278	120	0	0	280
Category 1 Storm Surge	1,665	717	1	0	1,670
Category 2 Storm Surge	2,459	1,379	0	2	3,213
Category 3 Storm Surge	2,306	1,545	1	5	3,599
Category 4 Storm Surge	2,496	1,471	3	0	3,427
Sea Level Rise	590	886	0	0	2,064
Earthquake	11,308	11,881	23	49	28,807
Wildfire	1,516	559	0	0	1,302

REPETITIVE LOSS AND SEVERE REPETITIVE LOSS PROPERTIES

In addition to the spatial analysis conducted above, summary information for repetitive flood loss and severe repetitive flood loss properties within the Town of East Haven also provides an indication of vulnerable assets, especially with regard to properties insured under the National Flood Insurance Program that have experienced repeated flooding (see Table 4-53).[218]

[210] Based on data provided by the Town of East Haven.
[211] Based on building numbers from CT ECO.
[212] Based on a combination of data provided by the Town of East Haven and Hazus-MH.
[213] Data for historic assets was not available at the time of this analysis.
[214] Based on population numbers from 2010 census data.
[215] Data does not currently exist to determine vulnerable assets to the coastal erosion hazard.
[216] Dam failure inundation mapping was available for Class C dams. Inundation mapping was not available for other dams located in the town.
[217] Results for the flood hazard are not cumulative. Numbers and values of assets for events of increasing magnitude should be read as "in addition to" the preceding magnitudes.
[218] Based on information provided by the Federal Emergency Management Agency current as of 12/31/2012.

Table 4-53 Repetitive Flood Loss and Severe Repetitive Flood Loss Summary - East Haven

	Number of Losses	Number of Properties	Building Payments	Contents Payments	Total Payments
Repetitive Loss	649	218	$20,918,815	$1,787,493	$22,706,307
Severe Repetitive Loss	186	25	$4,946,271	$645,192	$5,591,463

The majority of the RL properties are single-family homes. Twelve are residential condominium units and 11 are multi-family homes. Seven RL properties (buildings) are non-residential, but only one appears to be commercial or industrial whereas six are associated with residential condominium complexes (for example, recreational buildings).

As of August 31, 2017, the Town of East Haven had a total of 1,630 claims totaling $33,429,802 in losses for all NFIP-insured structures.

Figure 4-31 through **Figure 4-34** show dams, storm surge, sea level rise, and wildfire hazard areas within the Town of East Haven.

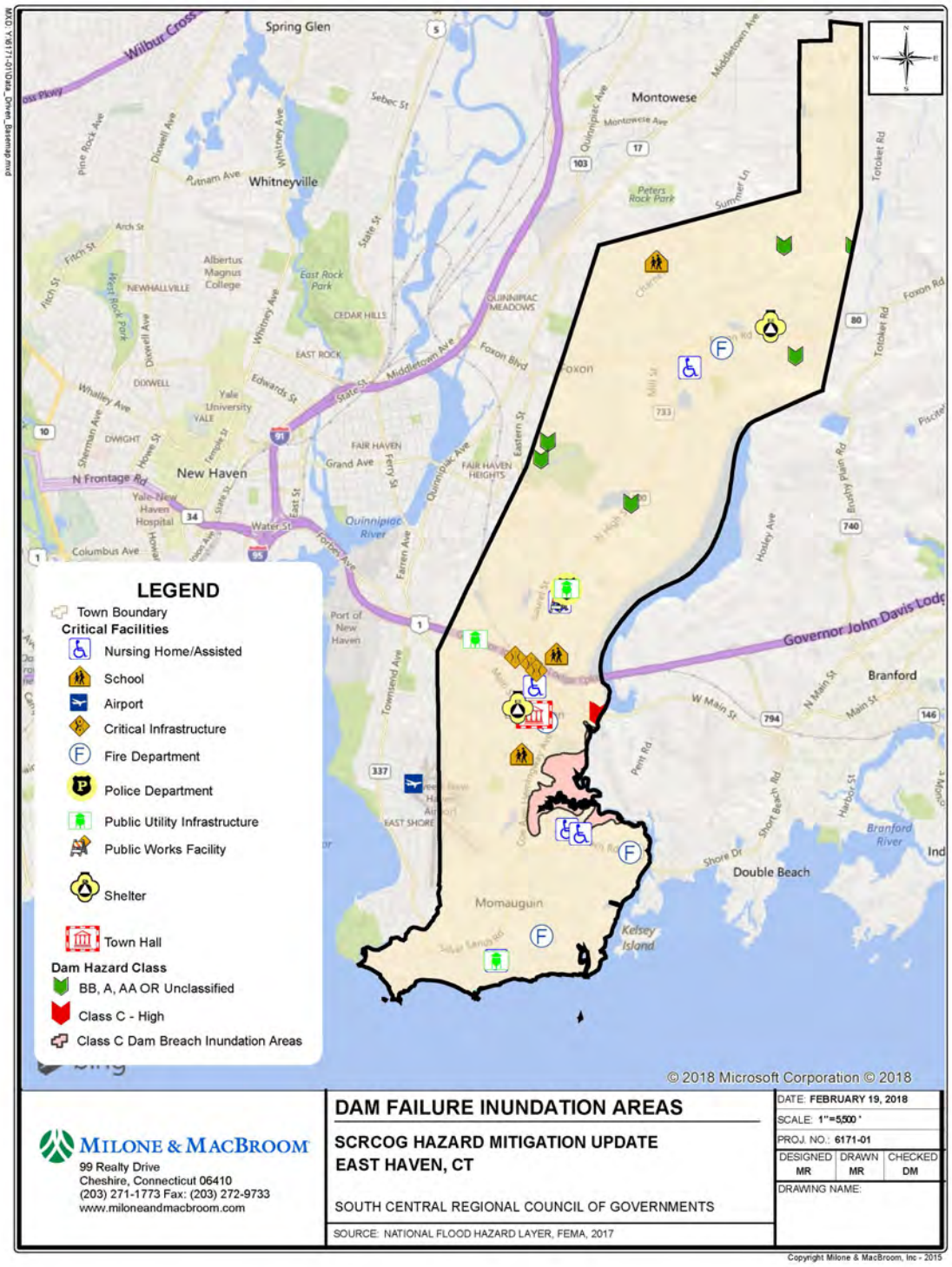


Figure 4-31 Dams Map – East Haven

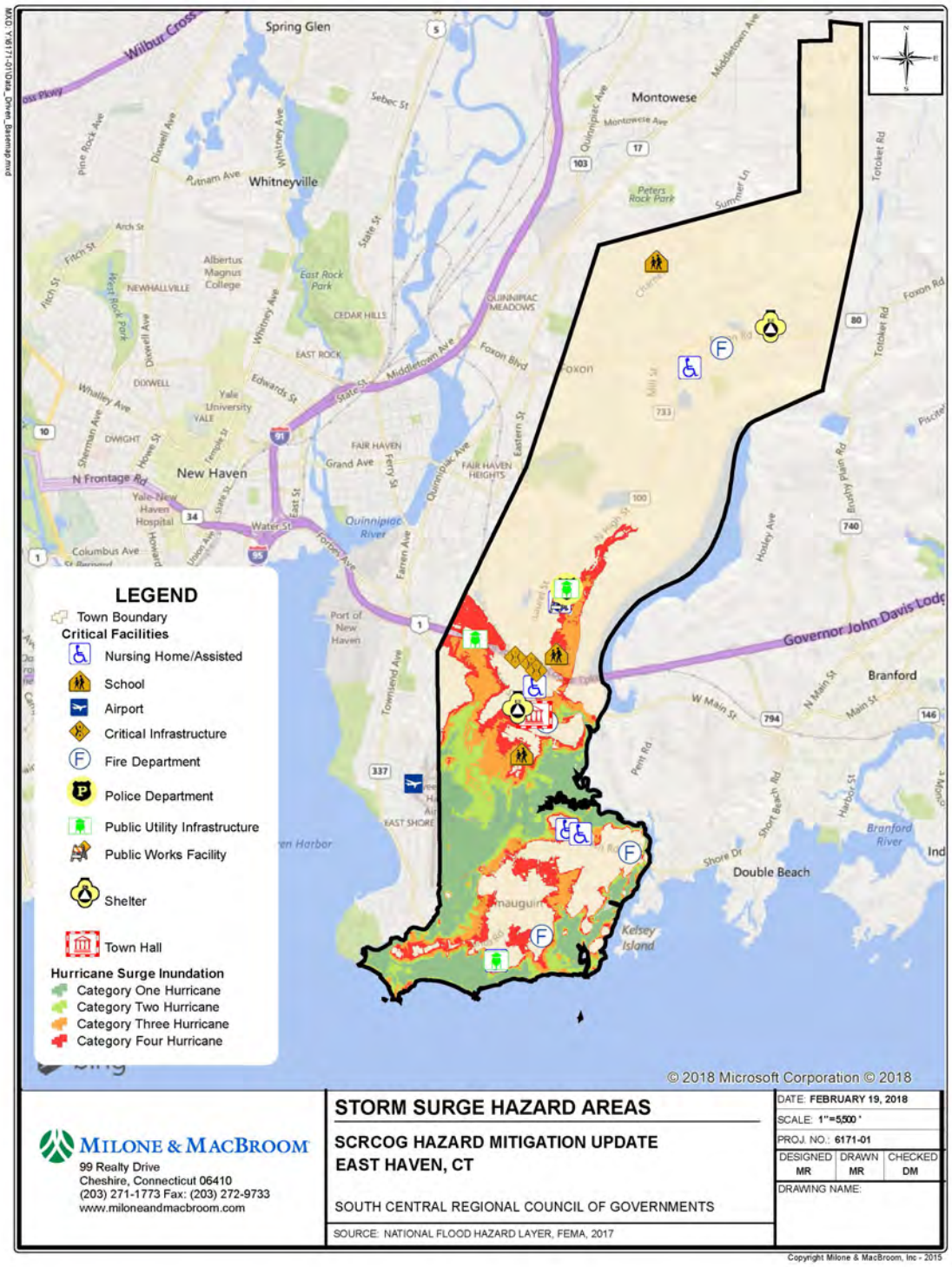


Figure 4-32 Hurricane Inundation Map – East Haven

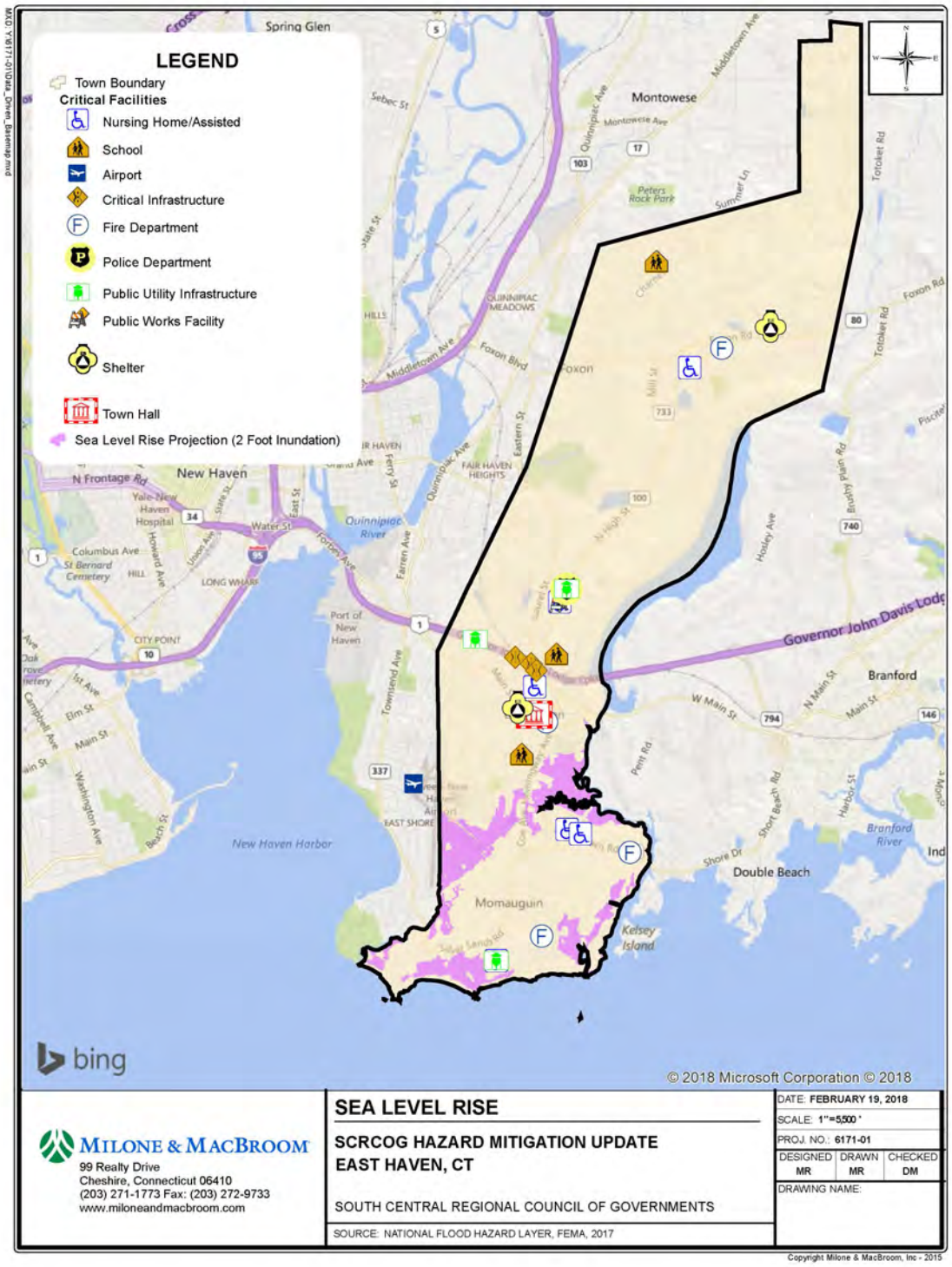


Figure 4-33 Sea Level Rise – East Haven

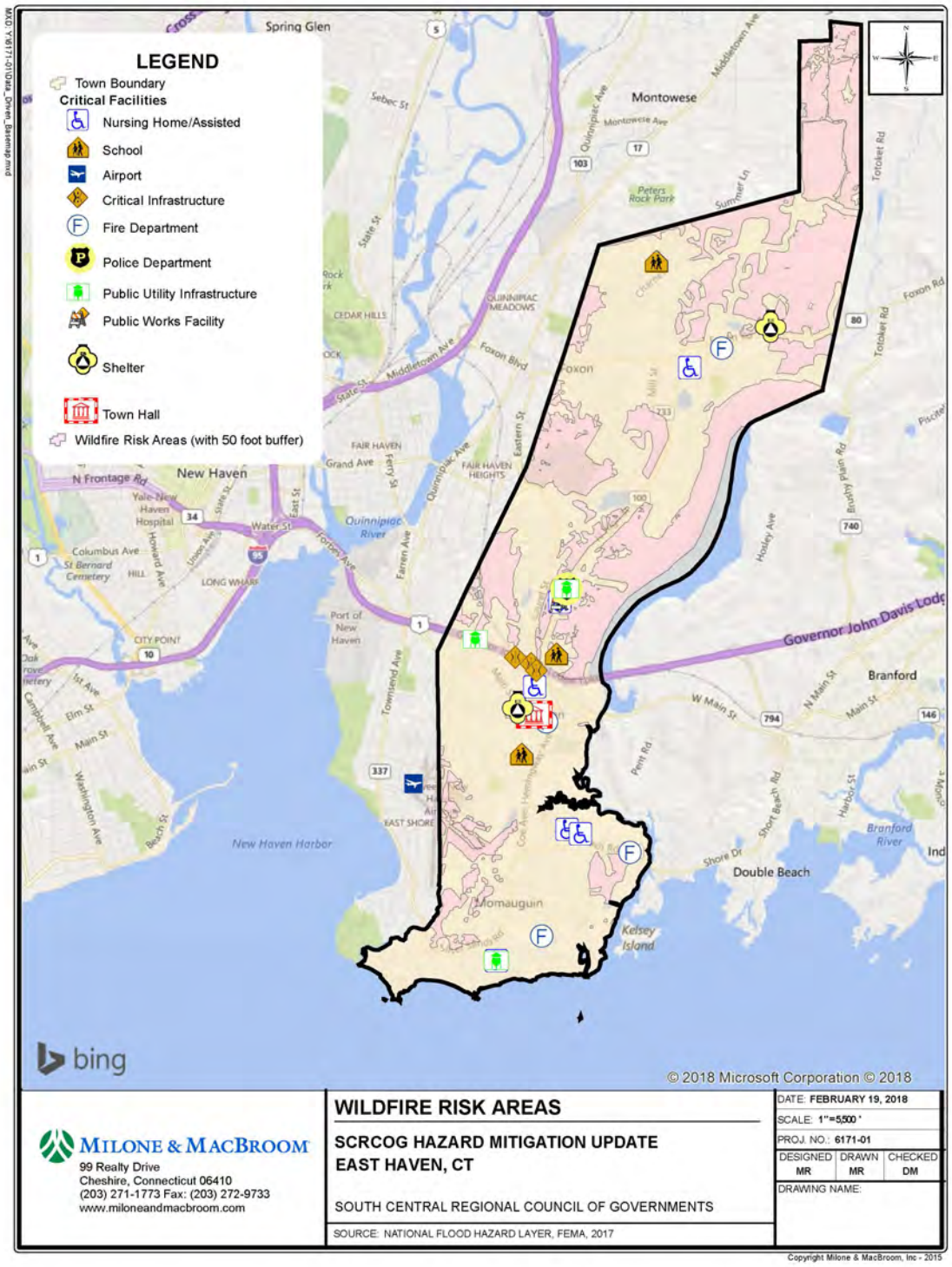


Figure 4-34 Wildfire Map – East Haven

POTENTIAL IMPACTS—EAST HAVEN

Table 4-54 shows the total estimated value of improved parcels (parcels that contain at least one building), critical facilities, and historic assets that intersect with known hazard areas, as an indicator of the potential impacts should a hazard event occur.

Table 4-54 Potential Impacts by Hazard – East Haven[219]

Hazard	Value of At-Risk Parcels[220]	Value of At-Risk Critical Facilities[221]	Value of At-Risk Historic Assets[222]
Extreme Temperatures	$2,863,456,157	$172,611,068	$17,569,812
Hurricane/Tropical Storm	$2,863,456,157	$172,611,068	$17,569,812
Severe Thunderstorm	$2,863,456,157	$172,611,068	$17,569,812
Severe Winter Storm/Nor'easter	$2,863,456,157	$172,611,068	$17,569,812
Tornado	$2,863,456,157	$172,611,068	$17,569,812
Coastal Erosion[223]	$59,331,377	$18,854,775	$0
Dam Failure			
High Hazard (Class C)	$51,876,308	$0	$3,879,240
Significant Hazard[224] (Class B)	N/A	N/A	N/A
Drought	$2,863,456,157	$172,611,068	$17,569,812
Flood[225][226]			
1-Percent-Annual-Chance	$875,136,275	$91,508,361	$8,764,705
0.2-Percent-Annual-Chance	$277,608,021	$57,611,053	$2,675,481
Zone VE	$151,010,031	$18,854,775	$0
Category 1 Storm Surge	$417,081,739	$18,854,775	$6,349,153
Category 2 Storm Surge	$622,243,011	$47,398,203	$7,282,319
Category 3 Storm Surge	$767,250,786	$81,848,977	$8,764,705
Category 4 Storm Surge	$768,621,179	$83,996,378	$12,412,255
Sea Level Rise	$276,140,739	$18,854,775	$278,737
Earthquake	$2,863,456,157	$172,611,068	$17,569,812
Wildfire	$625,607,406	$101,996,453	$278,737

[219] Potential Impacts are based on parcel exposure, not building exposure. It is possible for a historic asset or critical facility building to not be exposed, yet its associated parcel intersects a hazard area. The parcel value will then be reflected in the Potential Impacts Table.
[220] Based on data provided by the Town of Branford.
[221] Based on data provided by the Town of Branford.
[222] Based on data provided by the Town of Branford.
[223] Coastal Erosion Hazard determined using Analysis of Shoreline Change in Connecticut - published by DEEP, Sea Grant, and UConn/CLEAR
[224] Dam failure inundation mapping was available for Class C dams. Inundation mapping was not available for other dams located in the town.
[225] Results for the flood hazard are not cumulative. Numbers and values of assets for events of increasing magnitude should be read as "in addition to" the preceding magnitudes.
[226] Results for the hurricane inundation areas are cumulative. Numbers and values of assets for events of increasing magnitude should be read as "consisting of" the preceding magnitudes.

LOSS ESTIMATES—EAST HAVEN

DETAILED HAZUS-MH LOSS ESTIMATES

Riverine Flood

Estimated building losses for the riverine flood hazard generated by Hazus-MH are broken down into two categories: direct building losses and business interruption losses. The direct building losses are the estimated costs to repair or replace the damage caused to the building and its contents. The business interruption losses are the losses associated with the inability to operate a business because of the damage sustained during the flood. Business interruption losses also include the temporary living expenses for those people displaced from their homes because of the flood (see **Table 4-55**).

Table 4-55 Riverine Flood Loss Estimates (1-Percent-Annual-Chance Flood) - Branford

	2014 Results Millions of Dollars					2017 Results Millions of Dollars				
	Residential	Commercial	Industrial	Others	Total	Residential	Commercial	Industrial	Others	Total
Direct Building Loss										
Building	$18.45	$3.21	$0.79	$0.75	$23.21	$9.23	$2.67	$0.61	$0.29	$12.80
Contents	$13.52	$10.54	$1.39	$4.39	$29.84	$4.89	$9.46	$1.09	$1.80	$17.24
Inventory	$0.00	$0.22	$0.22	$0.02	$0.47	$0	$0.17	$0.15	$0	$0.32
Subtotal	**$31.97**	**$13.96**	**$2.41**	**$5.16**	**$53.51**	**$14.12**	**$12.29**	**$1.85**	**$2.10**	**$30.36**
Business Interruption										
Income	$0.02	$0.04	$0.00	$0.01	$0.06	$0	$0.06	$0	$0.01	$0.07
Relocation	$0.01	$0.00	$0.00	$0.00	$0.03	$0.02	$0.01	$0	$0	$0.03
Rental Income	$0.01	$0.00	$0.00	$0.00	$0.01	$0	$0.01	$0	$0	$0.01
Wage	$0.04	$0.05	$0.00	$0.18	$0.28	$0.01	$0.07	$0	$0.06	$0.14
Subtotal	**$0.07**	**$0.10**	**$0**	**$0.19**	**$0.37**	**$0.04**	**$0.14**	**$0**	**$0.07**	**$0.25**
TOTAL	**$32.04**	**$14.06**	**$2.41**	**$5.35**	**$53.88**	**$14.16**	**$12.43**	**$1.85**	**$2.17**	**$30.61**

In addition, Hazus estimates that 328 (564 in the 2012 results) households will be displaced due to the flood. Displacement includes households evacuated from within or very near to the inundated area. 756 (1,406 in the 2012 results) individuals will seek temporary shelter in public shelters.

These inland flooding results show a decrease in the estimated losses from a 1% annual-chance flood between the previous and the current Hazus-MH results. It is likely that the New Haven County FIS update, along with incremental improvements in the Hazus-MH program over the last few years, are the primary reasons for those differences.

Coastal Flood

Estimated building losses for the coastal flood hazard generated by Hazus-MH are broken down into two categories: direct building losses and business interruption losses. The direct building losses are the estimated costs to repair or replace the damage caused to the building and its contents. The business interruption losses are the losses associated with the inability to operate a business because of the damage sustained during the flood. Business interruption losses also include the temporary living expenses for those people displaced from their homes because of the flood (see **Table 4-56**).

Table 4-56 Coastal Flood Loss Estimates (100-year Event) - East Haven

	2014 Results Millions of Dollars					2017 Results Millions of Dollars				
	Residential	Commercial	Industrial	Others	Total	Residential	Commercial	Industrial	Others	Total
Direct Building Loss										
Building	$49.28	$12.76	$4.10	$0.49	$66.63	$76.69	$13.39	$3.47	$0.59	$94.14
Contents	$32.96	$30.69	$9.87	$2.37	$75.90	$67.93	$33.13	$7.27	$3.12	$111.44
Inventory	$0.00	$0.84	$1.53	$0.06	$2.44	$0	$0.67	$0.98	$0.06	$1.72
Subtotal	**$82.25**	**$44.30**	**$15.50**	**$2.92**	**$144.96**	**$144.61**	**$47.19**	**$11.73**	**$3.77**	**$207.30**
Business Interruption										
Income	$0.01	$0.18	$0.00	$0.00	$0.18	$0	$0.02	$0	$0.01	$0.23
Relocation	$0.09	$0.05	$0.00	$0.00	$0.14	$0.18	$0.06	$0	$0	$0.24
Rental Income	$0.02	$0.04	$0.00	$0.00	$0.05	$0.05	$0.04	$0	$0	$0.09
Wage	$0.01	$0.17	$0.00	$0.03	$0.21	$0.01	$0.19	$0	$0.04	$0.24
Subtotal	**$0.12**	**$0.43**	**$0**	**$0.04**	**$0.59**	$0.24	$0.50	$0	$0.05	$0.79
TOTAL	**$82.37**	**$44.73**	**$15.50**	**$2.95**	**$145.55**	**$144.86**	**$47.69**	**$11.73**	**$3.82**	**$208.09**

One police station would experience at least moderate damage and loss of use. Two schools would experience at least moderate damage, and one of those would experience loss of use. (The results from the 2012 Plan shows no police stations experiencing either at least moderate damage or loss of use, and only one school experiencing at least moderate damage and loss of use).

In addition, the Hazus-MH model estimates 1,495 households will be displaced due to the flood. Displacement includes households evacuated from within or very near to the inundated area. Of these, 4,041 people will seek temporary shelter in public shelters.

These coastal flooding results show an increase in the estimated losses from a 1% annual-chance flood between the previous and the current Hazus-MH results. It is likely that the New Haven County FIS update, along with incremental improvements in the Hazus-MH program over the last few years, are the primary reasons for those differences.

Hurricane Wind

Hazus-MH was used to model probabilistic hurricane wind impacts for the 10-, 20-, 50-, 100-, 200-, 500- and 1,000-year events. These annualized return periods compare to the Saffir-Simpson Scale in the following way:

- 10-year Tropical Depression/Tropical Storm
- 20-year Tropical Storm
- 50-year Tropical Storm/Category 1
- 100-year Category 1/Category 2
- 200-year Category 2
- 500-year Category 3
- 1000-year Category 3

The number of buildings estimated to be damaged and the resulting building-related economic losses are shown in **Table 4-57** and **Table 4-58**.

Table 4-57 Number of Buildings Damaged - East Haven

	Return Period	Minor	Moderate	Severe	Destruction	Total
2014 Results	10-year	0	0	0	0	0
	20-year	12	0	0	0	12
	50-year	233	23	1	0	257
	100-year	1,046	157	5	2	1,211
	200-year	2,363	596	46	26	3,031
	500-year	3,614	1,601	304	179	5,699
	1,000-year	3,806	2,530	812	510	7,658
2017 Results	10-year	0	0	0	0	0
	20-year	8	0	0	0	8
	50-year	82	6	0	0	88
	100-year	425	48	1	0	473
	200-year	1,147	186	7	2	1,342
	500-year	2,280	566	43	21	2,910
	1,000-year	3,164	1,106	139	73	4,482

Table 4-58 Building-Related Economic Losses - Branford

	Return Period	Minor	Moderate	Severe	Destruction	Total
2014 Results	10-year	$0	$0	$0	$0	$0
	20-year	$449,170	$18,850	$6,130	$1,690	$475,830
	50-year	$6,895,570	$240,630	$63,630	$32,000	$7,231,840
	100-year	$21,427,450	$1,458,940	$541,910	$264,780	$23,693,070
	200-year	$60,733,480	$6,230,170	$2,813,320	$1,268,010	$71,044,990
	500-year	$193,060,470	$24,839,520	$11,118,260	$3,967,300	$232,985,550
	1,000-year	$413,300,020	$62,957,660	$22,655,330	$9,282,880	$508,195,890
2017 Res	10-year	$0	$0	$0	$0	$0
	20-year	$384,400	$0	$0	$0	$384,400

	Return Period	Minor	Moderate	Severe	Destruction	Total
	50-year	$6,588,370	$125,740	$33,390	$18,660	$6,766,150
	100-year	$19,272,810	$656,740	$199,520	$112,520	$20,241,590
	200-year	$40,917,590	$2,434,990	$973,170	$453,860	$44,779,610
	500-year	$93,771,570	$8,071,710	$3,603,300	$1,751,200	$107,197,780
	1,000-year	$182,257,420	$17,993,990	$8,644,670	$3,511,050	$212,407,130

Additionally, shelter needs and debris generation are modeled by Hazus-MH. Results are in **Table 4-59.**

Table 4-59 Hurricane Shelter Needs & Debris Production - East Haven

	Return Period	Debris Generated (Tons)	Households Displaced	Individuals Seeking Temporary Shelter
2014 Results	10-year	0	0	0
	20-year	0	0	132
	50-year	0	0	1,174
	100-year	13	2	5,200
	200-year	52	13	10,489
	500-year	153	35	20,145
	1,000-year	321	71	34,012

Other modeled impacts of this event include the following effects on essential facilities:

- After a 500-year hurricane: 10 of 12 schools are expected to lose at least one day of use.
- After a 1,000-year hurricane: 0 of 36 hospital beds are available the day of the event; after one week, all 36 beds are operational. All 12 schools are expected to lose at least one day of use.

These hurricane wind results show a decrease in the losses from high wind events between previous and current Hazus-MH results. The difference in results is most likely explained by incremental improvements in the Hazus-MH program over the last few years.

Earthquake

An earthquake scenario was developed using Hazus-MH that models a magnitude 6.4 earthquake with an epicenter 10 kilometers below East Haddam. The number of buildings estimated to be damaged and the resulting building-related economic losses are shown in **Table 4-60** and **Table 4-61.**

Table 4-60 Number of Buildings Damaged - East Haven

	Slight	Moderate	Extensive	Complete	Total
2012 Plan	1,710	589	104	13	2,416
2017 Plan	1,929	737	178	39	2,883

Table 4-61 Building-Related Economic Losses - East Haven

	Residential	Commercial	Industrial	Others	Total
2012 Plan	$46,670,000	$22,980,000	$5,940,000	$3,450,000	$79,040,000
2017 Plan	$83,970,000	$63,330,000	$17,490,000	$9,860,000	$174,660,000

Other modeled impacts of this event include:

- Essential Facilities:
  - No essential facilities experience more than 50% damage
  - Following the event, the functionality of essential facilities is as follows:
    - Hospital: 46% after one day, 68% after one week, and 89% after 30 days
    - Schools: Six of twelve are more than 50% functional the day after the event
    - Police Stations: one of two are more than 50% functional the day after the event
    - Fire Stations: One of one are more than 50% functional the day after the event
- Transportation Infrastructure:
  - Only 22 of 37 highway segments are more than 50% functional after one week
  - One highway bridge experiences at least moderate damage, a loss of $11.28 million
  - One light rail segment is less than 50% functional for more than one week
  - The airport experiences $1.27 million in damages (this is Tweed New Haven Airport)
- Utilities:
  - Potable water pipelines: 113 leaks and 28 breaks. Total water system losses are $2,890,000
  - Wastewater pipelines: 81 leaks and 20 breaks, a loss of $360,000
  - Natural gas pipelines: 23 leaks and 6 breaks, a loss of $10,000
  - No loss of service
- Shelter: 207 household will be displaced, with 114 individuals seeking temporary shelter in public shelters
- 6 to 23 individuals may require hospitalization, and 1 to 5 individuals may be killed, depending on the time of day the earthquake strikes

These earthquake results show an increase in the losses from an earthquake event between previous and current Hazus-MH results. The difference in results is most likely explained by changes in the inventory data used by Hazus-MH (for example, the amount of highway infrastructure increased by more than double between Hazus-MH version 2.1 and 4.0), as well as incremental improvements in the Hazus-MH program over the last few years.

ANNUALIZED LOSS ESTIMATES

Table 4-62 shows annualized loss estimates (ALE) for each hazard. Estimates were derived from a number of sources, as described in the Methodology section, and included in column two of the table:

- NFIP: Historic flood insurance claims processed for the community
- PA: Historic Public Assistance grants awarded to the community
- State HMP: Localized estimates based on those presented in the 2014 Connecticut Hazard Mitigation Plan
- HAZUS: Hazus-MH results from modeling performed for this multi-jurisdictional plan
- State HAZUS: Hazus-MH results from modeling performed for the 2014 Connecticut Hazard Mitigation Plan

Hazus-MH results for flooding and earthquake hazards (as run for this multi-jurisdictional plan) were not able to be annualized, and so are not included in the table below.

Table 4-62 Annualized Loss Estimates by Hazard – East Haven

Hazard	Source	2018 HMP ALE
Flooding	NFIP	$855,320
	PA	$57,742
	State HMP	$6,736
Hurricane Wind Thunderstorm	HAZUS	$1,013,196
	PA	$28,871
	State HMP	$2,748
Tornado Winter Storm Dam Failure	State HMP	$286,807
	PA	$26,801
	State HMP	$213
	State HMP	$1,169
Wildfire	State HMP	$7,354
Earthquake	State HAZUS	$55,295

PROBLEM STATEMENTS—EAST HAVEN

Table 4-63 provides statements of particular interest with regard to primary hazards of concern, geographic areas of concern, and vulnerable community assets within the Town of East Haven. If applicable, any noted potential solutions or mitigation actions are discussed with the problem statements.

Table 4-63 Problem Statements – East Haven

Primary Hazards of Concern	
Trees	The town has a tree warden but lacks sufficient fund and equipment to meet need of removing diseased trees.
Coastal and Inland Flooding	Coastal and inland flooding are the primary concern in East Haven.
Wind	Excessive wind damage caused by hurricanes, nor'easters and other coastal storms is also a great concern, particularly as it relates to trees/limbs and other woody debris.
Sea Level Rise	Sea level rise is a growing concern because of increased risks to coastal flooding and erosion, and the disappearance of East Haven's tidal wetlands.
Geographic Areas of Concern	
SFHAs along the coast and the Farm River and Tuttle Brook corridors	Current SFHAs along the coast and the Farm River and Tuttle Brook corridors, which are all characterized by significant development (residential for the former; residential and commercial for the latter).
North of Interstate 95 residential neighborhoods	North of Interstate 95, chronic flooding occurs in residential neighborhoods between the Saltonstall Ridge and North High Street. There has been periodic flooding of many residential areas along the Farm River, particularly along Hellstrom Road and Raymond Court.
South of Interstate 95 and along Route 42	A broad area south of Interstate 95 is below the elevation of the 100-year coastal flood event. Chronic flooding occurs along Route 42 and in areas adjacent to the large tidal marsh to east of Route 42.
Pardee Place Extension, Main Street and Frontage Road	Several homes on Pardee Place Extension and businesses on Main Street and Frontage Road experience flooding from Tuttle Brook. Tuttle Brook at the intersection of Main Street frequently floods during significant rain events. The Frontage Road plaza

	parking lots flood frequently, leaving automobiles in the parking lot under water.
Cosey Beach Avenue	Cosey Beach was devastated by the storm surge from Tropical Storm Irene and remains at high risk to future storms, erosion, and sea level rise. The existing roadway (Cosey Beach Avenue) is frequently flooded due to spring tides and coastal storms.
Airport	Airport – marshland and flood area – airport drainage has improved, now have underground holding areas for water that redirect flow and keep water in check
Shore Beach Road/Route 42	Shore Beach Road/Route 42 is a flooding concern
Hemingway Avenue	Hemingway Avenue – repaving and will raise the intersection 4-5 years
Coastal Areas	• Meadow Street along Farm River Estuary • Old Town Highway in the Shell Beach/Morgan Point Area • Minor Road along Long Island Sound • Coe Avenue, Hemingway Avenue, and Short Beach Road near the Farm River Estuary Brazos Road and Fairview are the only roads in and out of the coastal community. The Regional Framework includes two designs for fixing this problem, one that elevates Brazos and abandons Farview; and one that elevates Farview and abandons Brazos. The logical mitigation action is to advance the design and permitting, since construction within five years is not likely.
Vulnerable Community Assets	
Above Ground Powerlines	Above ground powerlines are especially susceptible to damage caused by falling trees and limbs. Many tree limbs on East Haven roadways are not suited to withstand high wind and snow or ice loads. Many of the inland roads are narrow and bordered by private forest land. Utility poles on Main Street belong to Frontier who run phone and cable, there is no point in putting just electric underground.
Bridge adjacent to Interstate 95	Bridge adjacent to Interstate 95
Roadways	Many roads, particularly along coastal areas, are susceptible to flooding; while those in inland areas are at risk to blockage caused by downed trees, tree limbs, and powerlines.
Police Station (417 North High Street) and Public Works Facility (461 North High Street)	The Town's police station (417 North High Street) and public works facility (461 North High Street) are in Special Flood Hazards Areas (SFHAs) associated with the Farm River. The East Haven Middle School/Carbone School (67 Hudson Street) is located adjacent to the SFHA. While these facilities are not believed to have significantly flooded in recent years, the potential exists for severe flooding.
Tweed-New Haven Regional Airport	Tweed-New Haven Regional Airport is in a coastal SFHA and Category 1 Hurricane Storm Surge Inundation Area.
Sewer Pump Station	Located in areas of concern and subject to coastal flooding.

CHANGES/IMPROVEMENTS SINCE 2014

- East Haven was not a part of the original Multi-Jurisdiction Hazard Mitigation Plan. These problem statements were developed from their 2012 Hazard Mitigation Plan and updated to reflect current conditions.

GUILFORD

CRITICAL FACILITIES – GUILFORD

Table 4-64 contains a list of critical facilities provided by the Town of Guilford. These are depicted on **Figure 4.22** along with FEMA flood zones.

Table 4-64 Critical Facilities – Guilford

Facility	Location	Emergency Power Supply?	Shelter?	In Floodplain or Coastal Flood Hazard Area?	In Surge Zones?
Emergency Services					
Police Station	400 Church Street	Yes	No	No	No
Fire Headquarters	390 Church Street	Yes	No	No	No
Fire Station	10 Graves Avenue	Yes	No	No	Cat. 4
Fire Station	120 Whitfield Street	Yes	No	No	Cat. 3
Fire Station	51 Water Street	Yes	No	Yes	Cat. 3
Fire Station	3087 Durham Road	Yes	No	No	No
Municipal Facilities					
Town Hall	31 Park Street	Yes	No	No	Cat. 4
DPW Facility/Town Garage	47 Driveway	Yes	No	Yes	Cat. 1
Transfer Station	1900 Boston Post Road	N/A	N/A	N/A	N/A
Library	67 Park Street	N/A	N/A	N/A	N/A
Brush & Leaf Disposal Area	Sullivan Drive	N/A	N/A	N/A	N/A
Shelters					
Community Center	32 Church Street	Yes	Yes	No	Cat. 4
Guilford High School	605 New England Road	No	Yes	No	No
Health Care and Senior Living Facilities					
Guilford House (former West Lake Lodge)	109 West Lake Avenue	Yes	No	No	No
Apple Rehab. (former Fowler Convalescent)	10 Boston Post Road	Yes	No	Yes	Cat. 1-4
The Gables	201 Granite Road	Yes	No	Yes	No
Yale-New Haven Shoreline Medical Center	111 Goose Lane	Yes	No	No	No
Boston Terrace (senior living)	41 Boston Terrace	Limited	No	Yes	Cat. 3-4
Sachem Hollow (senior living)	310 State Street	Limited	No	No	No
Guilford Court (senior living)	32 Guilford Court	Limited	No	No	No
Water and Wastewater					
CWC Tank	Sachem Head Road	N/A	N/A	N/A	N/A

VULNERABLE ASSETS—GUILFORD

Vulnerable assets were identified by intersecting GIS-based asset inventories and demographic data with known hazard boundaries to determine the number of parcels, buildings, critical facilities, historic assets, and populations exposed to each hazard. This results in an estimation of vulnerable assets by hazard as shown in **Table 4-65.** **Figure 4-35** depicts the location of critical facilities in Guilford while **Figure 4-36** depicts the locations of historic resources.

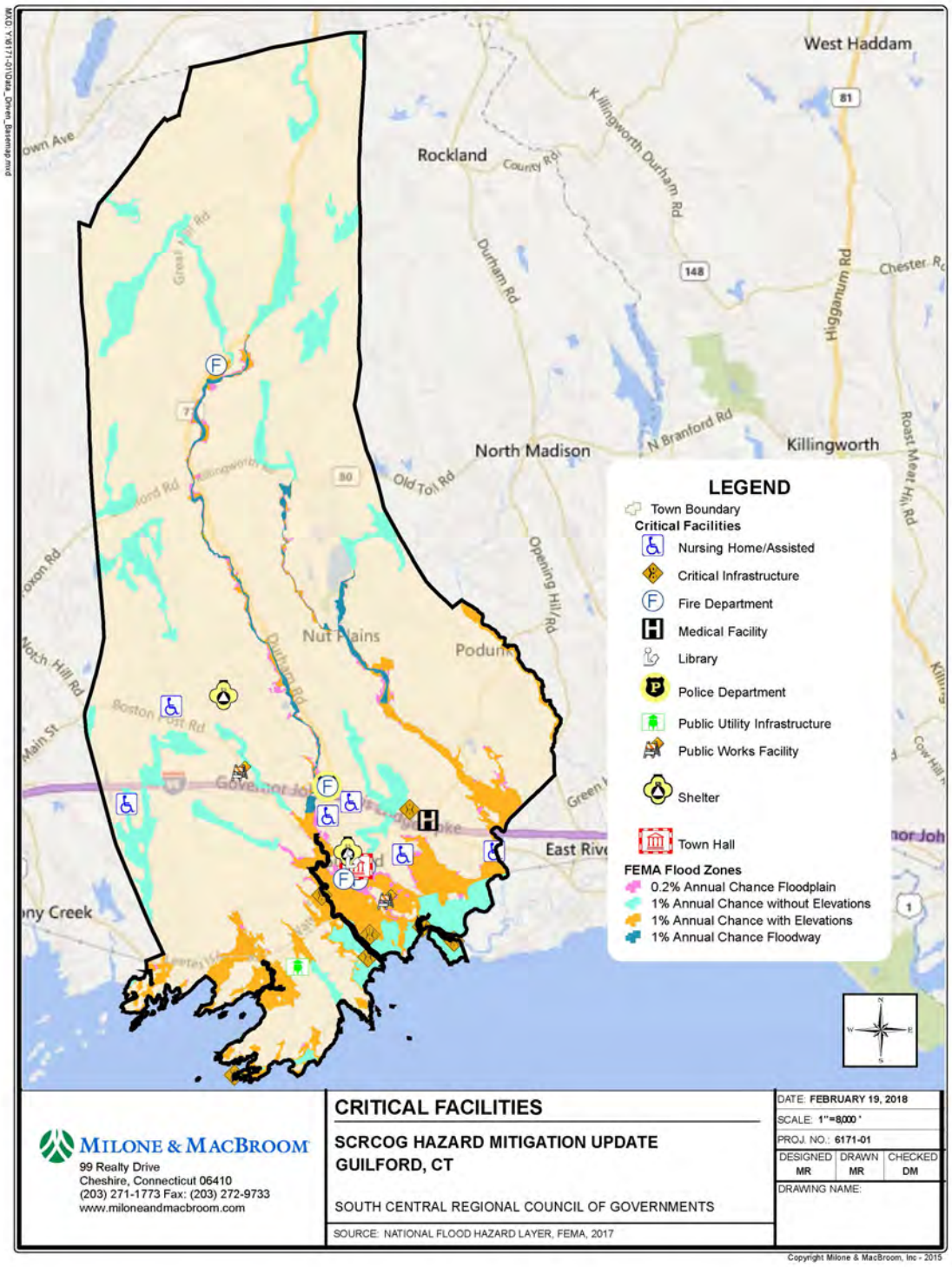


Figure 4-35 Critical Facilities and SFHA Map - Guilford

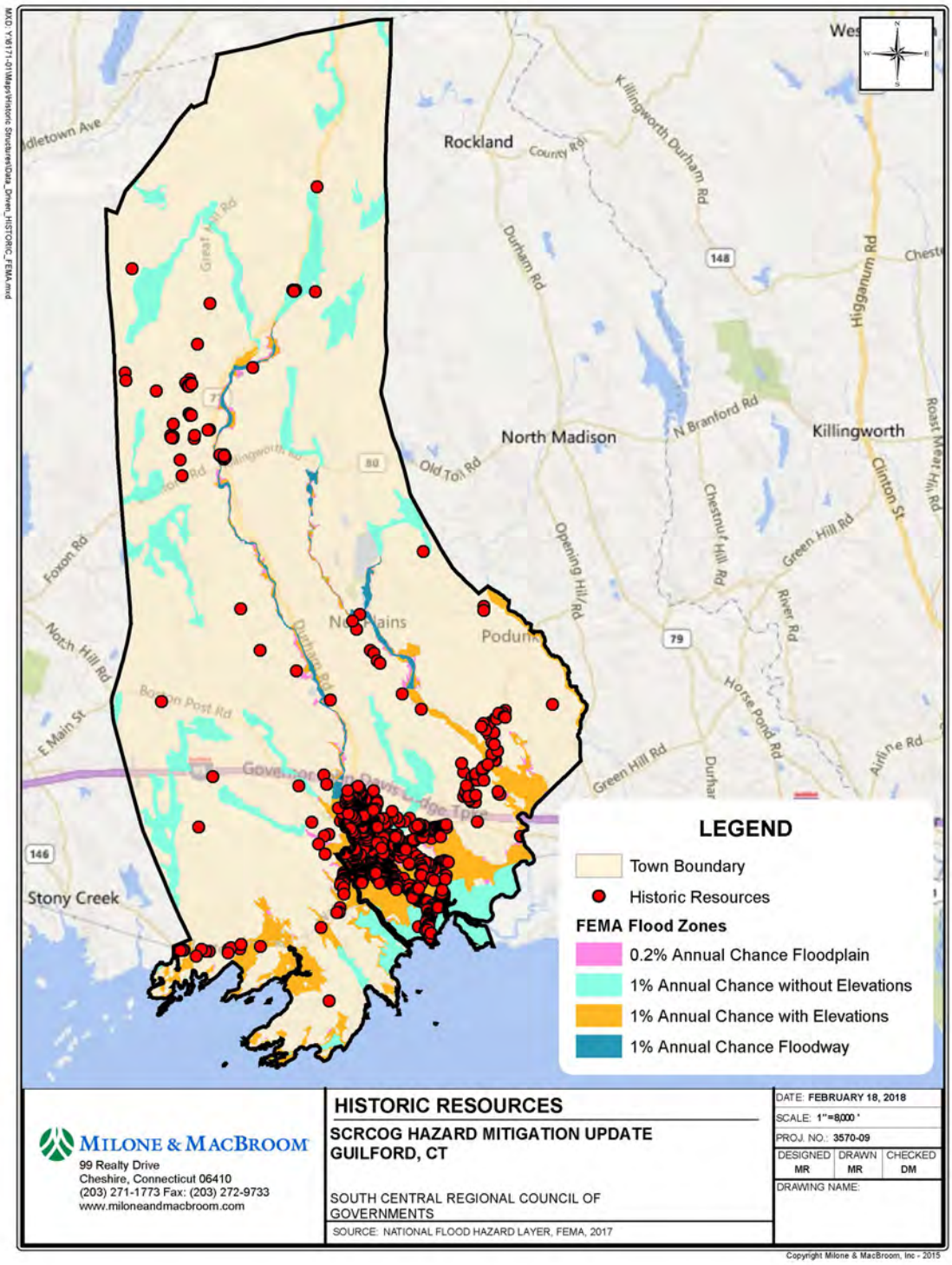


Figure 4-36 Historic Resources Map - Guilford

Table 4-65 Vulnerable Assets by Hazard - Guilford

Hazard	Number of Parcels[227]	Number of Buildings[228]	Critical Facilities[229]	Historic Assets[230]	Population[231]
Extreme Temperatures	10,522	11,351	27	1,016	3,916
Hurricane/Tropical Storm	10,522	11,351	27	1,016	22,375
Severe Thunderstorm	10,522	11,351	27	1,016	22,375
Severe Winter Storm/Nor'easter	10,522	11,351	27	1,016	22,375
Tornado	10,522	11,351	27	1,016	22,375
Coastal Erosion[232]	98	65	0	0	151
Dam Failure[233]					
High Hazard (Class C)	436	197	0	20	459
Significant Hazard (Class B)	N/A	N/A	N/A	N/A	N/A
Drought	10,522	11,351	27	1,016	22,375
Flood[234]					
1-Percent-Annual-Chance	2,617	1,127	2	181	2,626
0.2-Percent-Annual-Chance	850	381	3	112	888
Zone VE	593	170	2	0	396
Category 1 Storm Surge	1,868	300	1	0	699
Category 2 Storm Surge	2,055	717	1	96	1,671
Category 3 Storm Surge	1,750	839	6	180	1,955
Category 4 Storm Surge	1,332	547	2	68	1,275
Sea Level Rise	885	1,168	0	2	2,721
Earthquake	10,522	11,351	27	1,016	22,375
Wildfire	7,556	7,248	2	162	16,888

REPETITIVE LOSS AND SEVERE REPETITIVE LOSS PROPERTIES

In addition to the spatial analysis conducted above, summary information for repetitive flood loss and severe repetitive flood loss properties within the Town of Guilford also provides an indication of vulnerable assets, especially with regard to properties insured under the National Flood Insurance Program that have experienced repeated flooding (see **Table 4-66**).[235]

[227] Based on data provided by the Town of Guilford.
[228] Based on building numbers from CT ECO.
[229] Based on a combination of data provided by the Town of Guilford and Hazus-MH.
[230] Data for historic assets was not available at the time of this analysis.
[231] Based on population numbers from 2010 census data.
[232] Coastal Erosion Hazard determined using Analysis of Shoreline Change in Connecticut - published by DEEP, Sea Grant, and UConn/CLEAR
[233] Dam failure inundation mapping was available for Class C dams. Inundation mapping was not available for other dams located in the Town of Guilford.
[234] Results for the flood hazard are not cumulative. Numbers and values of assets for events of increasing magnitude should be read as "in addition to" the preceding magnitudes.
235 Based on information provided by the Federal Emergency Management Agency current as of 12/31/2012.

Table 4-66 Repetitive Flood Loss and Severe Repetitive Flood Loss Summary - Guilford

	Number of Losses	Number of Properties	Building Payments	Contents Payments	Total Payments
Repetitive Loss	147	63	$5,237,889	$635,480	$5,873,369
Severe Repetitive Loss	18	3	$231,086	$27,862	$258,948

The majority of the RL properties are single-family homes. One is a residential condominium unit and three are multi-family homes. Only four RL properties are non-residential. Three of these are water-dependent uses such as marinas, and one is a non-water-dependent commercial or industrial use.

As of July 31, 2017, the Town of Guilford had a total of 421 claims totaling $7,504,557 in losses for all NFIP-insured structures.

Figure 4-37 through Figure 4-40 show flood, storm surge, sea level rise, and wildfire hazard areas within the Town of Guilford.

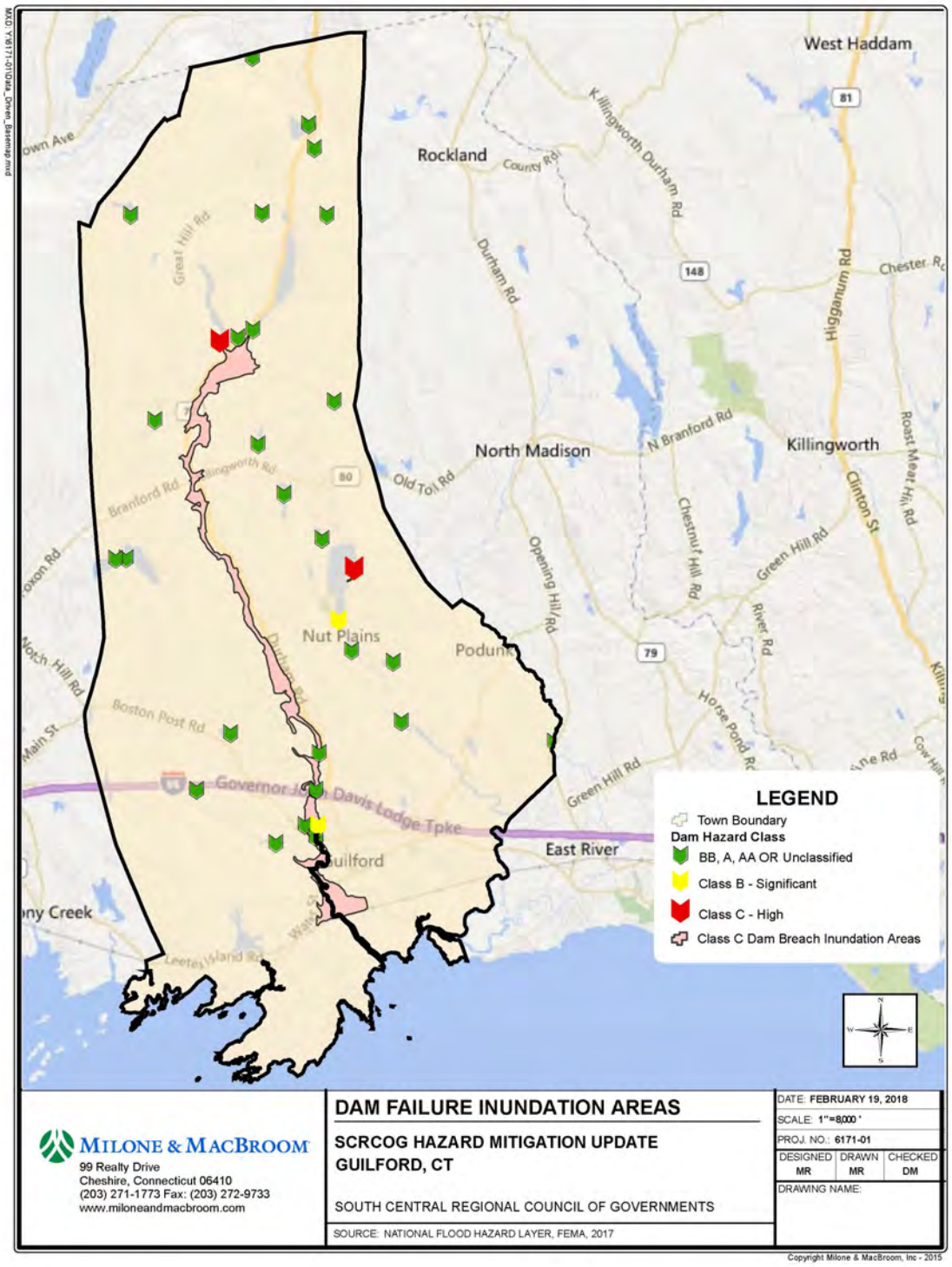


Figure 4-37 Dams Map – Guilford

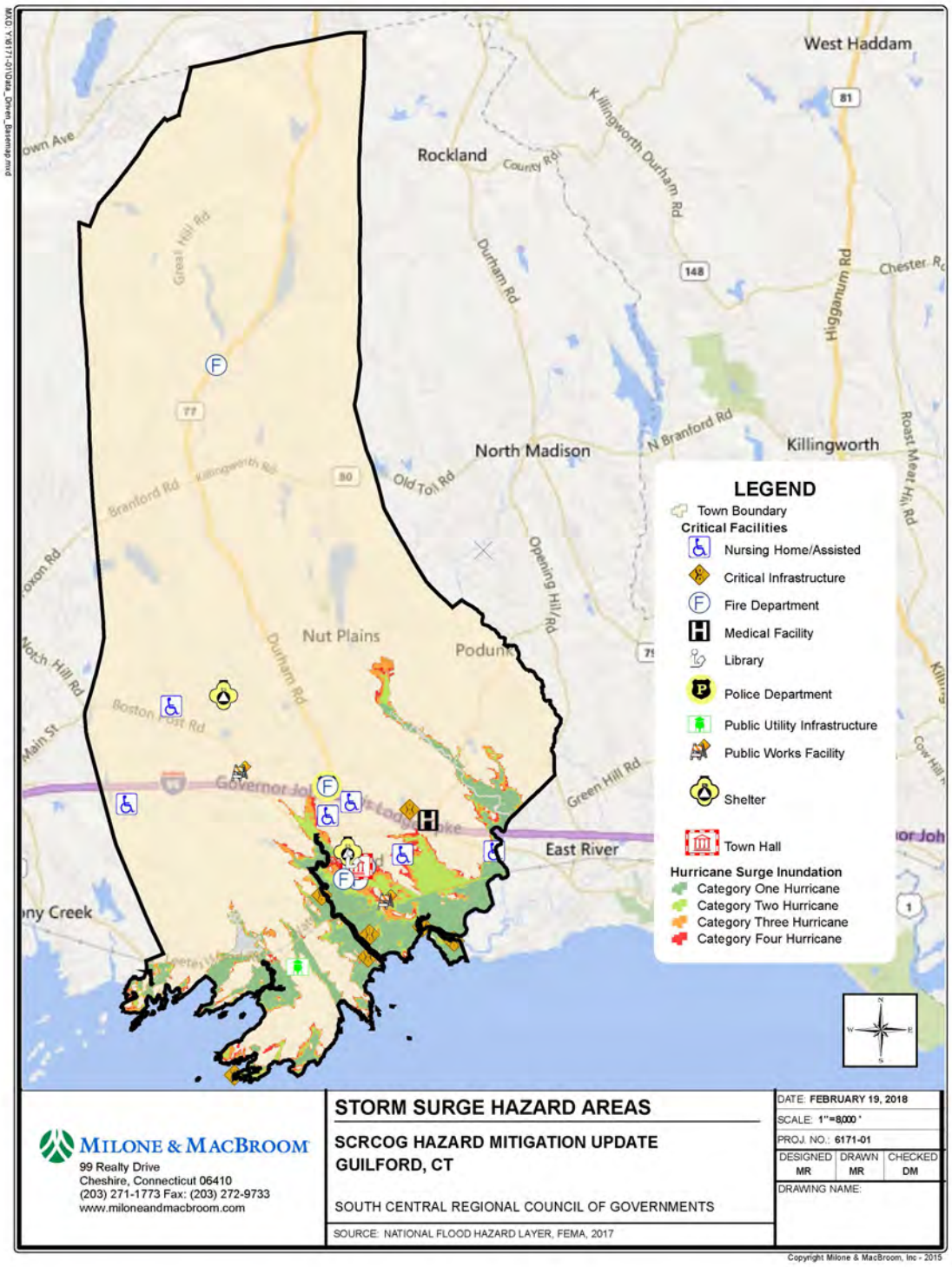


Figure 4-38 Hurricane Inundation Map - Guilford

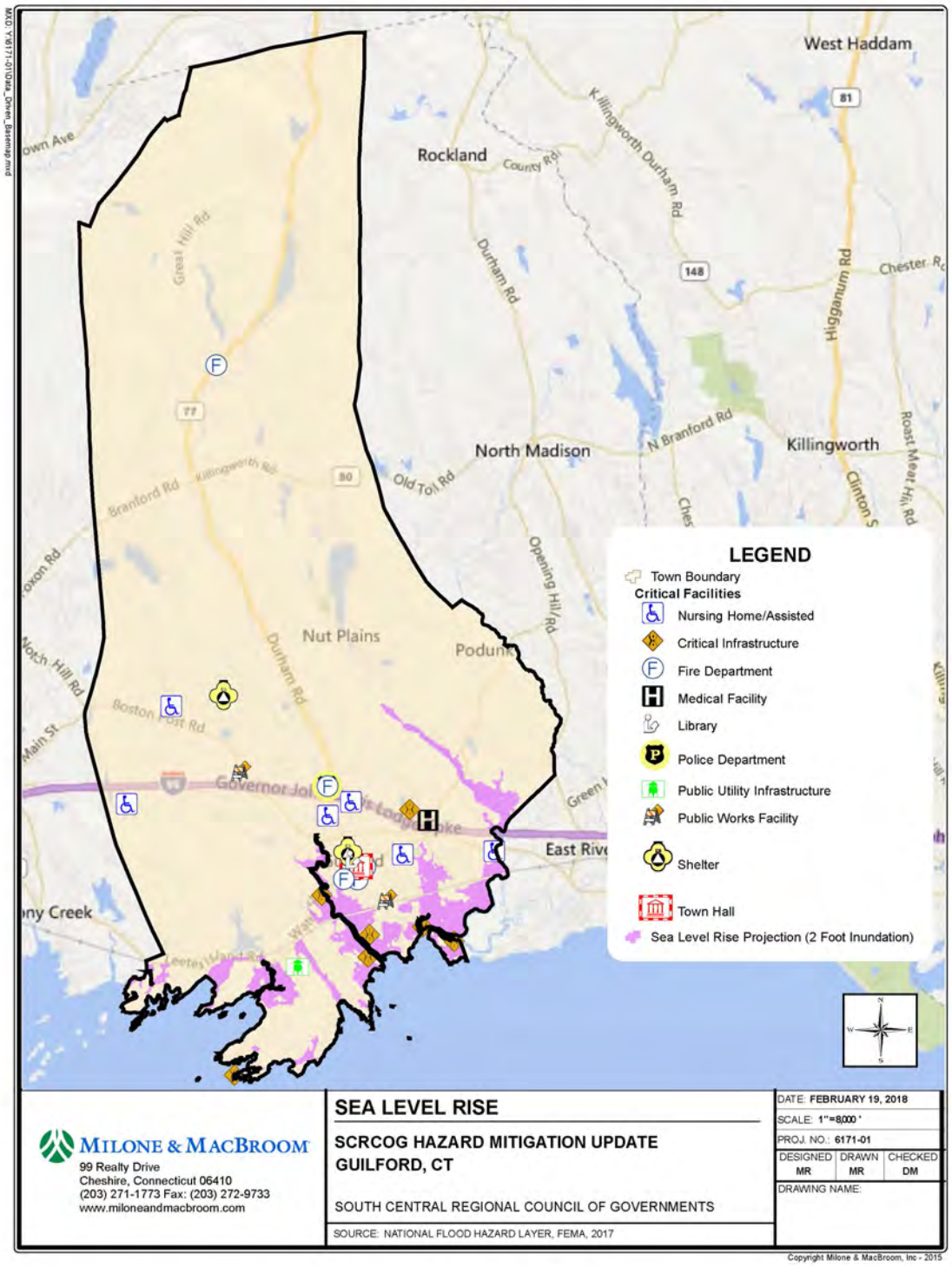


Figure 4-39 Sea Level Rise Map - Guilford

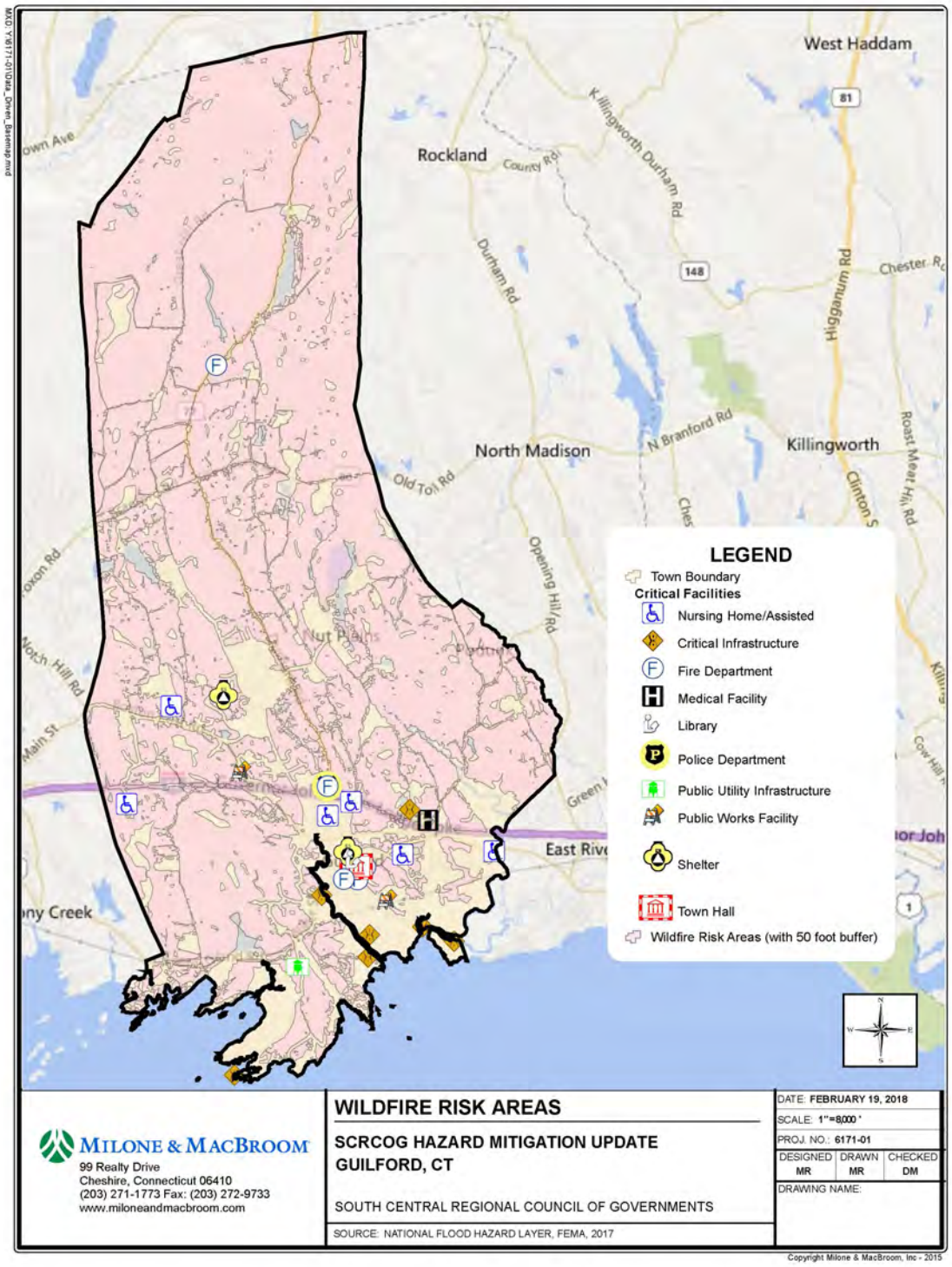


Figure 4-40 Wildfire Map - Guilford

POTENTIAL IMPACTS—GUILFORD

Table 4-67 shows the total estimated value of improved parcels (parcels that contain at least one building), critical facilities, and historic assets that intersect with known hazard areas, as an indicator of the potential impacts should a hazard event occur.

Table 4-67 Potential Impacts by Hazard – Guilford[236]

Hazard	Value of At-Risk Parcels[237]	Value of At-Risk Critical Facilities[238]	Value of At-Risk Historic Assets[239]
Extreme Temperatures	$4,205,345,344	$143,471,091	$347,794,073
Hurricane/Tropical Storm	$4,205,345,344	$143,471,091	$347,794,073
Severe Thunderstorm	$4,205,345,344	$143,471,091	$347,794,073
Severe Winter Storm/Nor'easter	$4,205,345,344	$143,471,091	$347,794,073
Tornado	$4,205,345,344	$143,471,091	$347,794,073
Coastal Erosion[240]	$89,649,712	$22,019,900	$279,238
Dam Failure[241]			
High Hazard	$159,049,678	$6,233,814	$21,581,043
Significant Hazard	N/A	N/A	N/A
Drought	$4,205,345,344	$143,471,091	$347,794,073
Flood[242][243]			
1-Percent-Annual-Chance	$1,077,840,829	$27,960,766	$127,282,873
0.2-Percent-Annual-Chance	$381,647,759	$13,047,914	$84,726,918
Zone VE	$490,676,874	$3,118,834	$16,507,092
Category 1 Storm Surge	$645,953,351	$5,887,303	$53,917,256
Category 2 Storm Surge	$826,724,468	$9,776,163	$99,147,159
Category 3 Storm Surge	$882,075,899	$9,795,874	$127,051,908
Category 4 Storm Surge	$755,028,388	$10,381,762	$103,612,660
Sea Level Rise	$612,653,960	$5,887,303	$38,923,272
Earthquake	$4,205,345,344	$143,471,091	$347,794,073
Wildfire	$1,046,541,897	$114,365,091	$86,498,354

[236] Potential Impacts are based on parcel exposure, not building exposure. It is possible for a historic asset or critical facility building to not be exposed, yet its associated parcel intersects a hazard area. The parcel value will then be reflected in the Potential Impacts Table..
[237] Based on data provided by the Town of Guilford.
[238] Based on data provided by the Town of Guilford.
[239] Based on data provided by the Town of Guilford.
[240] Coastal Erosion Hazard determined using Analysis of Shoreline Change in Connecticut - published by DEEP, Sea Grant, and UConn/CLEAR
[241] Dam failure inundation mapping was available for Class C dams. Inundation mapping was not available for other dams located in the town.
[242] Results for the flood hazard are not cumulative. Numbers and values of assets for events of increasing magnitude should be read as "in addition to" the preceding magnitudes.
[243] Results for the hurricane inundation areas are cumulative. Numbers and values of assets for events of increasing magnitude should be read as "consisting of" the preceding magnitudes.

LOSS ESTIMATES—GUILFORD

DETAILED HAZUS-MH LOSS ESTIMATES

Riverine Flood

Estimated building losses for the riverine flood hazard generated by Hazus-MH are broken down into two categories: direct building losses and business interruption losses. The direct building losses are the estimated costs to repair or replace the damage caused to the building and its contents. The business interruption losses are the losses associated with the inability to operate a business because of the damage sustained during the flood. Business interruption losses also include the temporary living expenses for those people displaced from their homes because of the flood (see **Table 4-68**).

Table 4-68 Riverine Flood Loss Estimates (1-Percent-Annual-Chance Flood) - Guilford

	2012 Results[244] Millions of Dollars					2017 Results Millions of Dollars				
	Residential	Commercial	Industrial	Others	Total	Residential	Commercial	Industrial	Others	Total
Direct Building Loss										
Building	$7.61	$1.04	$0.52	$0.01	$9.17	$2.92	$0.11	$0.05	$0.01	$3.08
Contents	$4.55	$2.80	$1.23	$0.03	$8.61	$1.24	$0.36	$0.10	$0.07	$1.77
Inventory	$0	$0.02	$0.17	$0.02	$0.21	$0	$0	$0	$0	$0
Subtotal	**$12.16**	**$3.86**	**$1.92**	**$0.05**	**$17.99**	**$4.16**	**$0.47**	**$0.15**	**$0.08**	**$4.86**
Business Interruption										
Income	$0	$0.01	$0	$0	$0.01	$0	$0	$0	$0	$0
Relocation	$0.01	$0	$0	$0	$0.01	$0	$0	$0	$0	$0
Rental Income	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Wage	$0	$0.01	$0	$0.01	$0.01	$0	$0	$0	$0	$0
Subtotal	**$0.01**	**$0.01**	**$0**	**$0.01**	**$0.02**	**$0**	**$0**	**$0**	**$0**	**$0**
TOTAL	**$12.16**	**$3.88**	**$1.92**	**$0.06**	**$18.02**	**$4.16**	**$0.47**	**$0.15**	**$0.08**	**$4.86**

[244] From the Guilford 2012 Hazard Mitigation Plan Update (Adopted June 4, 2012). Coastal and Inland flood losses were calculated simultaneously and then separated based on the percent-distribution of buildings between inland versus coastal flood zones; Inland flood damages are 31% of total flood damages calculated by that plan.

In addition, Hazus estimates 56 households will be displaced due to the flood. Displacement includes households evacuated from within or very near to the inundated area. Of these, 36 people will seek temporary shelter in public shelters.

These inland flooding results show a significant decrease in the estimated losses from a 1% annual-chance flood between the previous and the current Hazus-MH results. It is likely that the change in the definitions of inland and coastal flood zones is the primary reason for those differences; in fact, while the inland flood damage estimates listed above have decreased since the previous Plan, coastal flood damage estimates (provided in the next section) have increased significantly.

Coastal Flood

Estimated building losses for the coastal flood hazard generated by Hazus-MH are broken down into two categories: direct building losses and business interruption losses. The direct building losses are the estimated costs to repair or replace the damage caused to the building and its contents. The business interruption losses are the losses associated with the inability to operate a business because of the damage sustained during the flood. Business interruption losses also include the temporary living expenses for those people displaced from their homes because of the flood (see **Table 4-69).**

Table 4-69 Coastal Flood Loss Estimates (100-year Event) - Guilford

	2012 Results Millions of Dollars					2017 Results Millions of Dollars				
	Residential	Commercial	Industrial	Others	Total	Residential	Commercial	Industrial	Others	Total
Direct Building Loss										
Building	$16.94	$2.30	$1.17	$0.01	$20.42	$56.86	$8.15	$9.10	$0.69	$74.80
Contents	$10.12	$6.24	$2.74	$0.06	$19.15	$49.17	$23.43	$20.73	$3.70	$97.03
Inventory	$0.00	$0.06	$0.37	$0.05	$0.47	$0.00	$0.30	$2.31	$0.06	$2.67
Subtotal	**$27.06**	**$8.60**	**$4.27**	**$0.12**	**$40.04**	$106.03	$31.88	$32.14	$4.45	$174.51
Business Interruption										
Income	$0.00	$0.01	$0.00	$0.00	$0.01	$0.00	$0.09	$0.01	$0.01	$0.10
Relocation	$0.01	$0.00	$0.00	$0.00	$0.01	$0.10	$0.01	$0.00	$0.00	$0.11
Rental Income	$0.00	$0.00	$0.00	$0.00	$0.00	$0.02	$0.00	$0.00	$0.00	$0.02
Wage	$0.00	$0.01	$0.00	$0.01	$0.03	$0.01	$0.10	$0.00	$0.02	$0.13
Subtotal	**$0.01**	**$0.03**	**$0.00**	**$0.02**	**$0.06**	**$0.12**	**$0.19**	**$0.01**	**$0.03**	**$0.36**
TOTAL	**$27.08**	**$8.63**	**$4.27**	**$0.13**	**$40.10**	**$106.16**	**$32.07**	**$32.16**	**$4.48**	**$174.86**

One police station would experience at least moderate damage and loss of use. Two schools would experience at least moderate damage, and one of those would experience loss of use.

In addition, the Hazus-MH model estimates 555 households will be displaced due to the flood. Displacement includes households evacuated from within or very near to the inundated area. Of these, 1,322 people will seek temporary shelter in public shelters.

These coastal flooding results show a significant increase in the estimated losses from a 1% annual-chance flood between the previous and the current Hazus-MH results. It is likely that the change in the definitions of inland and coastal flood zones is the primary reason for those differences; in fact, while the coastal flood damage estimates listed above have increased since the previous Plan, inland flood damage estimates (provided in the previous section) have decreased. The New Haven County FIS update (which occurred since the previous HMP was adopted) likely also had a significant impact on the increased loss estimates.

Hurricane Wind

Hazus-MH was used to model probabilistic hurricane wind impacts for the 10-, 20-, 50-, 100-, 200-, 500- and 1,000-year events. These annualized return periods compare to the Saffir-Simpson Scale in the following way:

- 10-year Tropical Depression/Tropical Storm
- 20-year Tropical Storm
- 50-year Tropical Storm/Category 1
- 100-year Category 1/Category 2
- 200-year Category 2
- 500-year Category 3
- 1000-year Category 3

The number of buildings estimated to be damaged and the resulting building-related economic losses are shown in **Table 4-70** and **Table 4-71.**

Table 4-70 Number of Buildings Damaged - Guilford

	Return Period	Minor	Moderate	Severe	Destruction	Total
2014 Results	10-year	0	0	0	0	**0**
	20-year	9	0	0	0	**9**
	50-year	297	17	0	0	**314**
	100-year	1,176	146	7	4	**1,333**
	200-year	2,424	590	65	42	**3,121**
	500-year	3,432	1,619	435	287	**5,773**
	1,000-year	3,289	2,305	967	707	**7,268**
2017 Results	10-year	0	0	0	0	**0**
	20-year	4	0	0	0	**4**
	50-year	71	2	0	0	**73**
	100-year	378	23	1	0	**402**
	200-year	1,045	117	4	2	**1,166**
	500-year	2,155	418	33	15	**2,621**
	1,000-year	2,831	771	100	51	**3,753**

Table 4-71 Buildings-Related Economic Losses - Guilford

	Return Period	Minor	Moderate	Severe	Destruction	Total
2014 Results	10-year	$0	$0	$0	$0	$0
	20-year	$583,890	$32,410	$9,600	$4,730	$636,620
	50-year	$6,788,550	$422,640	$105,350	$70,960	$7,387,500
	100-year	$19,235,010	$2,666,960	$895,240	$768,390	$23,565,600
	200-year	$62,038,850	$9,984,350	$4,149,790	$2,770,990	$78,943,980
	500-year	$247,786,620	$40,344,120	$15,910,200	$8,450,380	$312,491,330
	1,000-year	$500,055,450	$90,061,350	$31,822,400	$15,707,960	$637,647,160
2017 Results	10-year	$0	$0	$0	$0	$0
	20-year	$129,390	$0	$0	$0	$129,390
	50-year	$5,240,810	$144,440	$33,890	$28,310	$5,447,450
	100-year	$15,002,360	$749,540	$201,710	$170,600	$16,133,210
	200-year	$32,186,730	$3,025,550	$951,850	$916,700	$37,080,820
	500-year	$80,926,350	$8,569,700	$3,361,350	$2,650,960	$95,508,360
	1,000-year	$148,461,360	$17,741,160	$7,307,260	$4,900,910	$178,410,700

Additionally, shelter needs and debris generation are modeled by Hazus-MH. Results are in **Table 4-72.**

Table 4-72 Hurricane Shelter Needs & Debris Production - Guilford

Return Period	Households Displaced	Individuals Seeking Temporary Shelter	Debris (Tons)
10-year	0	0	0
20-year	0	0	107
50-year	0	0	919
100-year	2	0	15,149
200-year	12	2	22,096
500-year	49	9	44,836
1,000-year	113	23	71,820

Other modeled impacts of this event include the following effects on essential facilities:

- After a 500-year hurricane seven of eight schools are expected to lose at least one day of use.
- After a 1,000-year hurricane all 8 schools are expected to lose at least one day of use.

These hurricane wind results show a significant decrease in the losses from high wind events between previous and current Hazus-MH results. The difference in results is most likely explained by incremental improvements in the Hazus-MH program over the last few years.

Earthquake

An earthquake scenario was developed using Hazus-MH that models a magnitude 6.4 earthquake with an epicenter 10 kilometers below East Haddam. The number of buildings estimated to be damaged and the resulting building-related economic losses are shown in **Table 4-73** and **Table 4-74.**

Table 4-73 Number of Buildings Damaged – Guilford

	Slight	Moderate	Extensive	Complete	Total
2012 Plan	2,247	990	225	42	3,504
2017 Plan	2,438	1,124	363	145	4,070

Table 4-74 Building-Related Economic Losses - Guilford

	Slight	Moderate	Extensive	Complete	Total
2012 Plan	$85,510,000	$58,490,000	$14,850,000	$8,510,000	$167,350,000
2017 Plan	$146,860,000	$184,490,000	$55,520,000	$26,520,000	$413.390,000

Other modeled impacts of this event include:

- Essential Facilities:
  - No essential facilities experience at least moderate damage
  - Following the event, the functionality of essential facilities is as follows:
    - Schools: zero of eight are more than 50% functional the day after the event
    - Police Stations: zero of one is more than 50% functional the day after the event
    - Fire Stations: Zero of one is more than 50% functional the day after the event
- Transportation Infrastructure:
  - 22 of 23 highway segments are more than 50% functional after one week
  - 2 of 29 highway bridges experience at least moderate damage; 27 bridges have greater than 50% functionality after day 1, 28 after one week; total highway losses are $18.20 million
  - Damages to light rail facilities are $480,000
- Utilities:
  - Potable water pipelines: 146 leaks and 36 breaks. Total water system losses are $660,000.
  - Wastewater pipelines: 105 leaks and 26 breaks, a loss of $470,000
  - Natural gas pipelines: 30 leaks and 7 breaks, a loss of $130,000
  - Communications utility damages are $10,000
  - 74 households are without service on day one; all service is restored by day 3
- Shelter: 144 households will be displaced, with 67 individuals seeking temporary shelter in public shelters
- 8 to 59 individuals may require hospitalization and 2 to 15 individuals may be killed, depending on the time of day the earthquake strikes

These earthquake results show an increase in the losses from an earthquake event between previous and current Hazus-MH results. The difference in results is most likely explained by incremental improvements in the Hazus-MH program over the last few years.

ANNUALIZED LOSS ESTIMATES

Table 4-75 shows annualized loss estimates (ALE) for each hazard. Estimates were derived from a number of sources, as described in the Methodology section, and included in column two of the table:

- NFIP: Historic flood insurance claims processed for the community
- PA: Historic Public Assistance grants awarded to the community
- State HMP: Localized estimates based on those presented in the 2014 Connecticut Hazard Mitigation Plan
- HAZUS: Hazus-MH results from modeling performed for this multi-jurisdictional plan
- State HAZUS: Hazus-MH results from modeling performed for the 2014 Connecticut Hazard Mitigation Plan

Hazus-MH results for flooding and earthquake hazards (as run for this multi-jurisdictional plan) were not able to be annualized, and so are not included in the table below.

Table 4-75 Annualized Loss Estimates by Hazard - Guilford

Hazard	Source	Annualized Loss Estimate
Flooding	NFIP	$192,425
	PA	$49,737
	State HMP	$5,151
Hurricane Wind Thunderstorm	HAZUS	$842,080
	PA	$24,869
	State HMP	$2,102
Tornado Winter Storm Dam Failure	State HMP	$219,342
	PA	$52,466
	State HMP	$163
	State HMP	$894
Wildfire	State HMP	$28,162
Earthquake	State HAZUS	$42,288

PROBLEM STATEMENTS—GUILFORD

Table 4-76 provides statements of particular interest with regard to primary hazards of concern, geographic areas of concern, and vulnerable community assets within the Town of Guilford. If applicable, any noted potential solutions or mitigation actions are discussed with the problem statements.

Table 4-76 Problem Statements – Guilford

Primary Hazards of Concern	
Coastal Flooding and Storm Surge	Coastal flooding is a well-documented natural hazard that threatens the Town far more frequently and in many more locations than inland flooding.
Sea Level Rise	There is an expressed concern in the plan regarding the continued increase in precipitation and sea level rise as it relates to future flood risk (inland and coastal).
High Winds	High winds – Most damage is a secondary result of wind speed and is caused by falling limbs and/or debris bringing about damage to public property. Of concern are the blockage of roads and the damage to the electrical power supply from falling trees and tree limbs. Many of the inland roads are narrow and bordered by private forest land, which is not cleared back from the right-of-way to prevent serious problems resulting from high winds.
Dam Failure	Dam failure– Failure of the Menuckatuck Reservoir Dam, Quonnipaug Lake Dam, Guilford Lakes and Valley Shore Dam would cause severe downstream flooding in Guilford.
Geographic Areas of Concern	
SFHAs	In general, the potential for flooding is widespread across Guilford, with most major

	flooding occurring along established SFHAs (see Figure 3-1 on page 3-2 of plan). A total of 644 structures in Guilford are located within or near the 100-year floodplain or the 100-year floodway delineated by FEMA with 197 structures (31%) associated with inland floodplains.
Route 146	FEMA mapping implies some level of flooding for vast areas south of Route 146 during 100-year coastal flood events.
West River corridor	The West River corridor is the primary area of vulnerability from inland flooding, with many of the problems occurring along Route 77.
Munger Brook between County Road and Route 80	The area along Munger Brook between County Road and Route 80 is reportedly a chronic flood-prone area.
Route 77/West River corridor south of Lake Quonnipaug and the Spinning Mill Brook Crossing of Long Hill Road above Route 1.	Nuisance flooding occurs along the Route 77/West River corridor south of Lake Quonnipaug and the Spinning Mill Brook Crossing of Long Hill Road above Route 1.
Sachems Head, Vineyard Point, Leetes Island, Tuttles Point, Indian Cove, and Mulberry Point	Several coastal areas of Guilford may become isolated from the mainland during coastal storms such as nor'easters and hurricanes. These areas include Sachems Head, Vineyard Point, Leetes Island, Tuttles Point, Indian Cove, and Mulberry Point as well as smaller unnamed areas adjacent to these.
North of I-95 and other areas prone to wildfires	The overall vulnerability of Guilford to wildfire hazards is believed to be relatively low (and the preparedness and responsiveness of the Guilford Fire Department is very strong), but the following locations are identified as areas of concern: • The limited access conservation properties are at the highest risk for fires. This is land to the north of I-95. For example, the East River Preserve located north of I-95 and the intersection of Clapboard Hill Road and Duck Hole Road to Leatherman Road, the Timberland Preserve, woodlands surrounding Guilford Lakes are believed to be possible locations for future wildfires. The woodlands covering much of the extreme northwest and northeast sections of Town are likewise areas of concern. • The area known as "West Woods" just south of I-95 Exit 57 in Guilford has experienced wildfires over the past five years. • Indian Cove and Mulberry Point are two coastal areas that are adjacent to extensive tidal marshes containing phragmites.
Vulnerable Community Assets	
	Neither the Community Center (primary shelter) nor the high school (secondary shelter) have hurricane-proof roofs, however both facilities meet current American Red Cross guidelines for shelters. Upgrades to the roofs to exceed local codes and meet hurricane wind standards are believed necessary, along with other modifications.
Three fire stations, the EOC, the Public Works building, and some senior living facilities	Three fire stations, the EOC, the Public Works building, and some senior living facilities are located within floodplains and/or hurricane storm surge inundation areas. The Public Works facility, proposed for relocation, is in a coastal flood zone and Category 1 hurricane surge zone associated with the Sluice Creek estuary.
Route 1	Route 1 just north of the West Side Cemetery has flooded during significantly high-volume precipitation events.
Town Hall	The Town's Reverse 911 Emergency Communications Center (ECC) is in the basement of Town Hall, a building that has a flood history (e.g., hurricane of 1938) but is not within a mapped floodplain according to FEMA.
Coastal Flooding Locations	The following locations have been identified by Guilford residents and Town officials as sites of chronic coastal flooding, where inundation occurs at least once every year and sometimes more frequently:

	• Several sections of Route 146 • Sachems Head Road at Route 146 • End of Whitfield Street near marina • Chimney Corner • Shell Beach Road • Vineyard Point Road • Daniel Avenue • Soundview Road • Seaside Avenue • River Street

CHANGES/IMPROVEMENTS SINCE 2012

- Guilford was not a part of the original Multi-Jurisdiction Hazard Mitigation Plan. These problem statements were developed from their 2012 Hazard Mitigation Plan and updated to reflect current conditions.

HAMDEN

CRITICAL FACILITIES – HAMDEN

Table 4-77 contains a list of critical facilities provided by the Town of Hamden. These are depicted on **Figure 4.28** along with FEMA flood zones.

Table 4-77 Critical Facilities – Hamden

Facility	Location	Emergency Power Supply?	Shelter?	In Floodplain or Coastal Flood Hazard Area?	In Surge Zones?
Emergency Services					
Police Department	2900 Dixwell Ave.	Yes	No	No	No
Fire Station 2	71 Circular Ave.	No	No	No	No
Fire Station 3	441 Hartford Turnpike	Yes	No	No	No
Fire Station 4	2372 Whitney Ave.	Yes	No	No	No
Fire Station 5	2993 Whitney Ave.	No	No	No	No
Fire Station 9	245 Johnson Rd.	Yes	No	No	No
Emergency Operations Center at Government Center	2750 Dixwell Ave	Yes	N/A	No	No
Municipal Facilities					
Keefe Community Center	11 Pine St.	N/A	Yes	No	No
Hamden High School	2040 Dixwell Ave.	Yes (but insufficient-60kW)	Yes	A SPFA area is close to or touches the western edge of	No

Facility	Location	Emergency Power Supply?	Shelter?	In Floodplain or Coastal Flood Hazard Area?	In Surge Zones?
				the building, but the designation is questionable.	
Middle School	2623 Dixswell Ave.	Yes (but insufficient-200kW)	Yes	No	No
Government Center	2750 Dixwell Ave	Yes, just replaced	N/A	No	No
Memorial Town Hall	2750 Dixwell Ave	Yes	N/A	No	No
Public Works		Yes	N/A	No	No
Public Works Vehicle Repair	1255 Shephard Street	Yes	N/A	No	No
Shelters					
Hamden High School	2040 Dixwell Ave.	Yes (but insufficient-60kW)	Yes	A SPFA area is close to or touches the western edge of the building, but the designation is questionable.	No
Hamden Middle School	2623 Dixswell Ave.	Yes (but insufficient-200kW)	Yes	No	No
Keefe Community Center	11 Pine St.	N/A	Yes	N/A	No
Health Care and Senior Living Facilities					
There are 11		N/A	N/A	No	No
Water and Wastewater					
Sewer pumping stations	There are eight of them: 151 Welton St., 2141 State St., 169 Arch St., 911 Whitney Ave., 340 Mill Rock Rd., 2586 State St., 449 Putnam Ave., 191 Old Chauncey Rd.	Yes - all but 449 Putnam Ave.	No	No	N/A
Stormwater Flood Control System	Meadowbrook	Yes	No	Yes	Yes
Other Infrastructure and Facilities					
South Central Regional Water Authority Water Treatment Plant	940 Whitney Ave.	Yes	No	No	No
Lake Whitney Dam	955 Whitney Ave		No	Yes	No
South Central Regional Water Authority Wellfield	0 Willow St.	Yes	No	No	No

VULNERABLE ASSETS—HAMDEN

Vulnerable assets were identified by intersecting GIS-based asset inventories and demographic data with known hazard boundaries to determine the number of parcels, buildings, critical facilities, historic assets, and populations exposed to each hazard. This results in an estimation of vulnerable assets by hazard as shown in **Table 4-78**. **Figure 4-41 depicts** critical facilities in Hamden while **Figure 4-42** depicts the locations of historic resources.

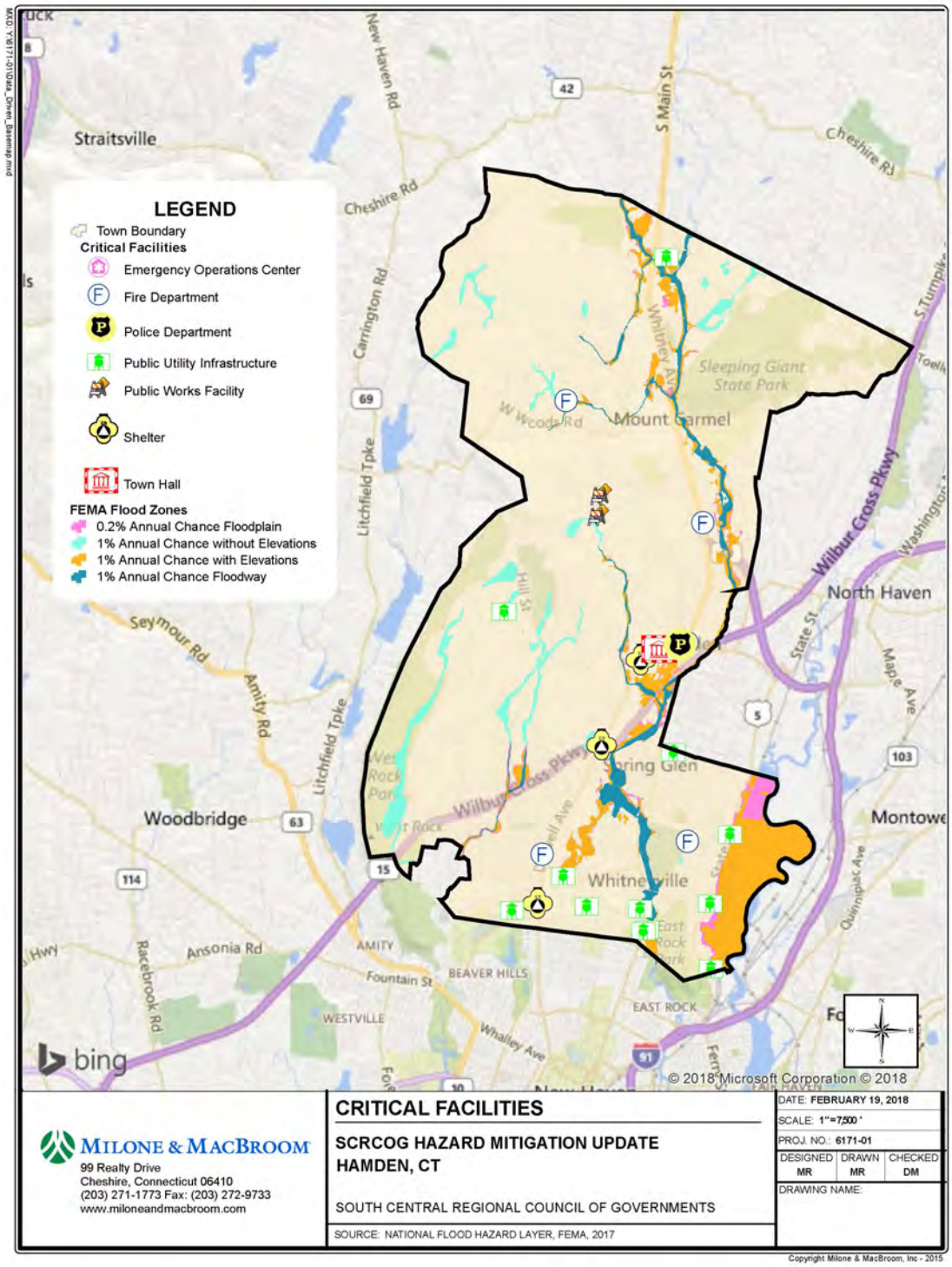


Figure 4-41 Critical Facilities and SFHA Map - Hamden

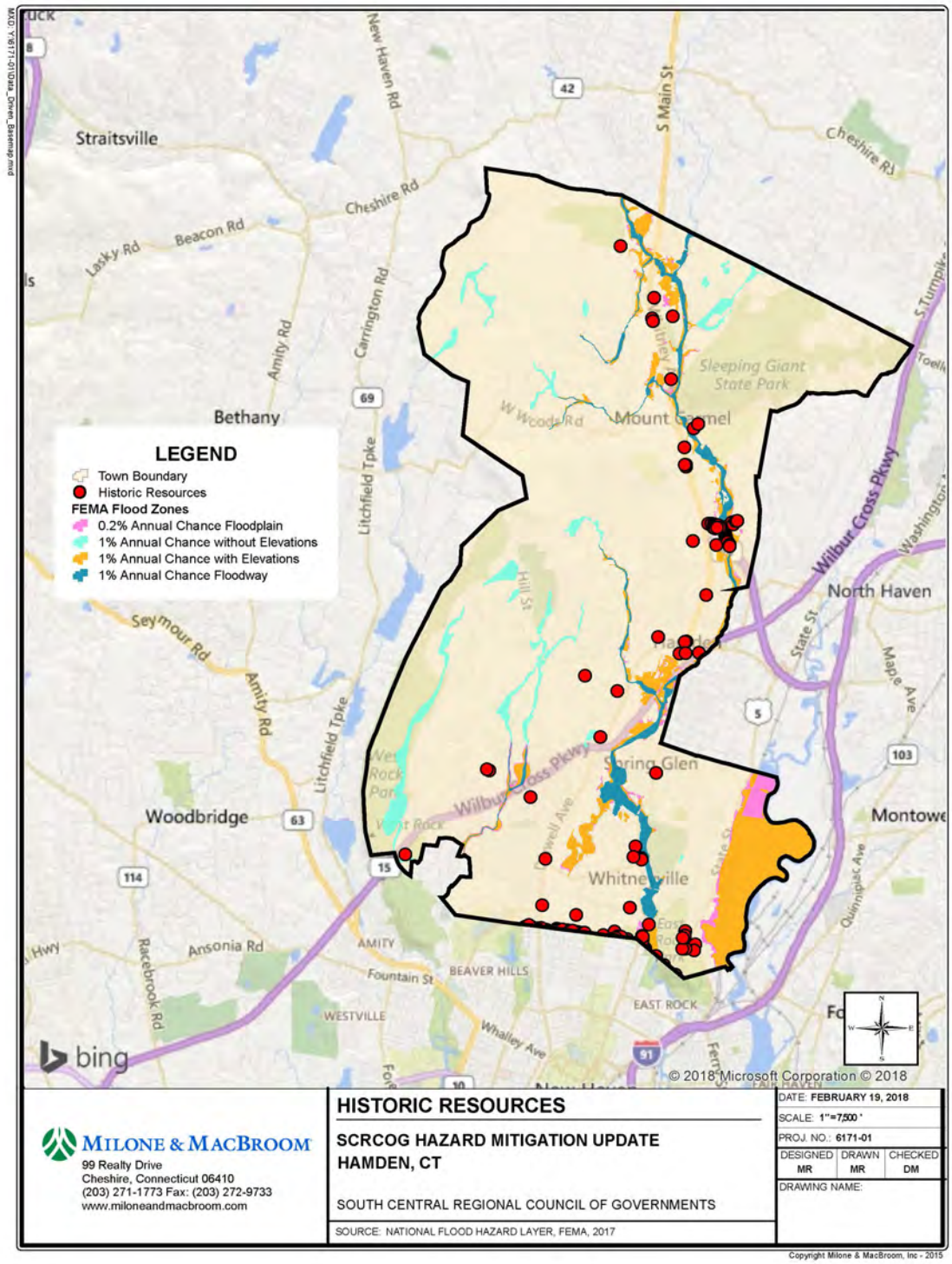


Figure 4-42 Historic Resources Map - Hamden

Table 4-78 Vulnerable Assets by Hazard - Hamden

Hazard	Number of Parcels[245]	Number of Buildings[246]	Critical Facilities[247]	Historic Assets[248]	Population[249]
Extreme Temperatures	16,760	21,581	26	85	9,144
Hurricane/Tropical Storm	16,760	21,581	26	85	60,960
Severe Thunderstorm	16,760	21,581	26	85	60,960
Severe Winter Storm/Nor'easter	16,760	21,581	26	85	60,960
Tornado	16,760	21,581	26	85	60,960
Dam Failure[250]					
High Hazard (Class C)	19	15	2	1	37
Significant Hazard (Class B)	N/A	N/A	N/A	N/A	N/A
Drought	16,760	21,581	26	85	60,960
Flood[251]					
1-Percent-Annual-Chance	983	383	3	3	931
0.2-Percent-Annual-Chance	571	282	3	0	685
Category 1 Storm Surge	59	25	0	0	61
Category 2 Storm Surge	140	115	0	1	279
Category 3 Storm Surge	250	204	0	0	496
Category 4 Storm Surge	235	185	0	1	449
Sea Level Rise	30	203	0	0	493
Earthquake	16,760	21,581	26	85	60,960
Wildfire	3,361	2,081	1	0	5,057

REPETITIVE LOSS AND SEVERE REPETITIVE LOSS PROPERTIES

In addition to the spatial analysis conducted above, summary information for repetitive flood loss and severe repetitive flood loss properties within the Town of Hamden also provides an indication of vulnerable assets, especially with regard to properties insured under the National Flood Insurance Program that have experienced repeated flooding (see Table 4-79).[252]

Table 4-79 Repetitive Flood Loss and Severe Repetitive Flood Loss Summary - Hamden

	Number of Losses	Number of Properties	Building Payments	Contents Payments	Total Payments
Repetitive Loss	124	48	$1,538,194	$726,884	$2,265,078
Severe Repetitive Loss	38	2	$937,732	$52,462	$990,194

[245] Based on data provided by the Town of Hamden.
[246] Based on building numbers from CT ECO.
[247] Based on a combination of data provided by the Town of Hamden and Hazus-MH.
[248] Data for historic assets was not available at the time of this analysis.
[249] Based on population numbers from 2010 census data.
[250] Dam failure inundation mapping was available for Class C dams. Inundation mapping was not available for other dams located in the town.
[251] Results for the flood hazard are not cumulative. Numbers and values of assets for events of increasing magnitude should be read as "in addition to" the preceding magnitudes.
[252] Based on information provided by the Federal Emergency Management Agency current as of 12/31/2012.

The majority of the RL properties are divided relatively evenly among single-family homes, multi-family homes, apartments, and condominium units. Only four RL properties are non-residential, and these appear to be commercial and industrial uses.

As of December 31, 2012, the Town of Hamden had a total of 536 claims totaling $3,331,391 in losses for all NFIP-insured structures. By July 31, 2017, that number had grown to 537 claims totaling $3,335,994.

Figure 4-43 through **Figure 4-46** show dam, storm surge, sea level rise, and wildfire hazard areas within the Town of Hamden.

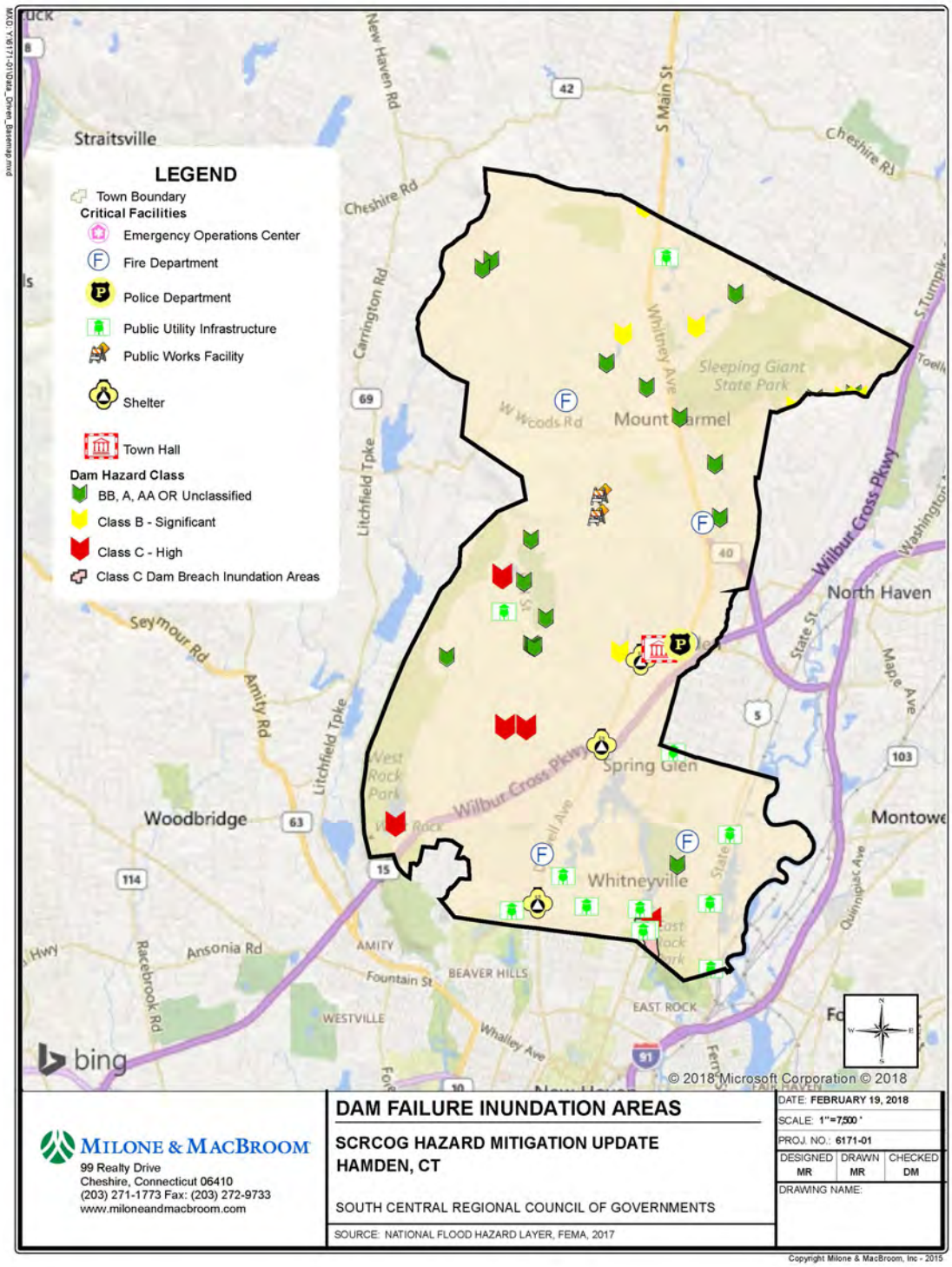


Figure 4-43 - Dams Map - Hamden

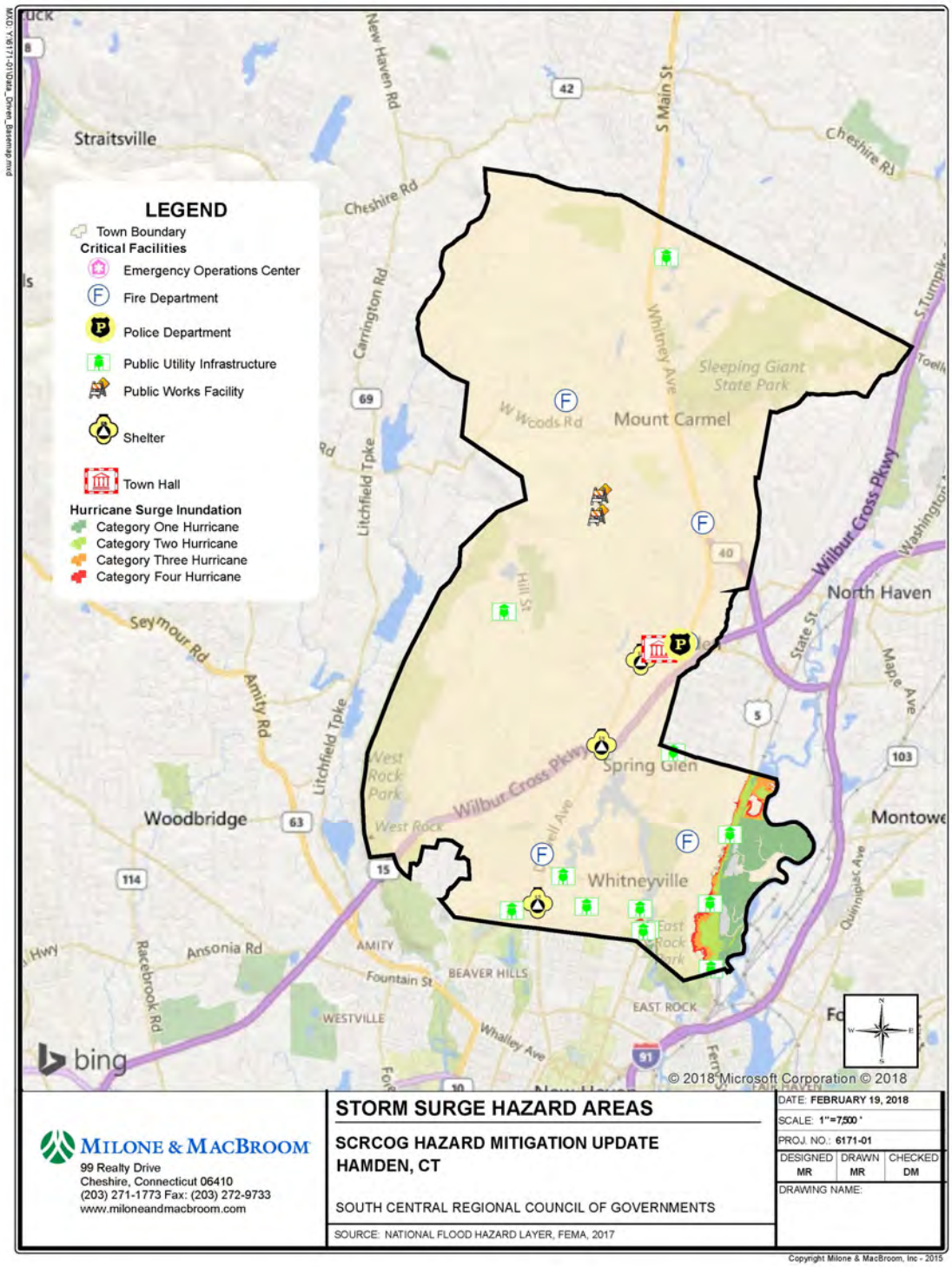


Figure 4- 44 Hurricane Inundation Map - Hamden

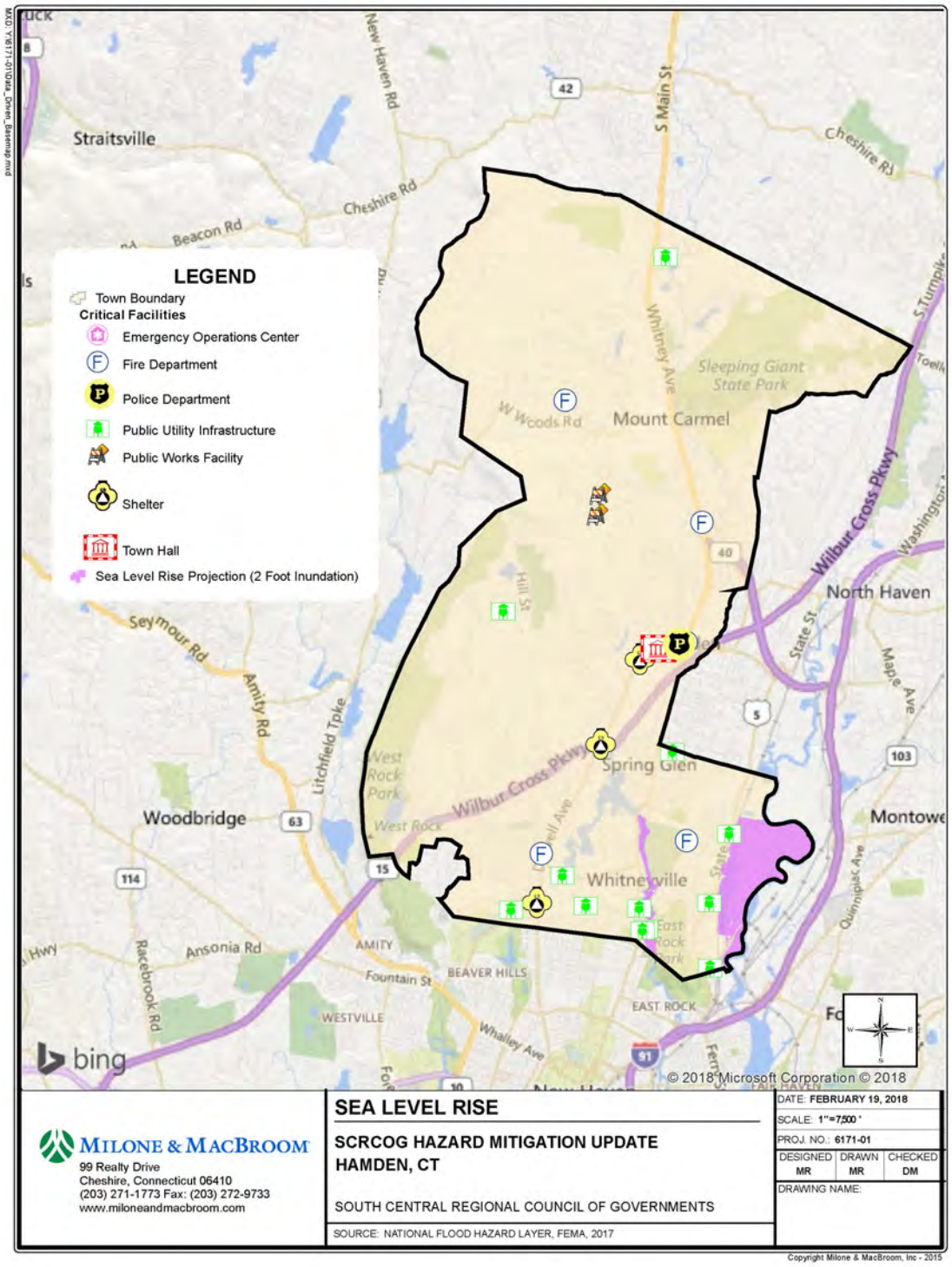


Figure 4-45 Sea Level Rise Map – Hamden

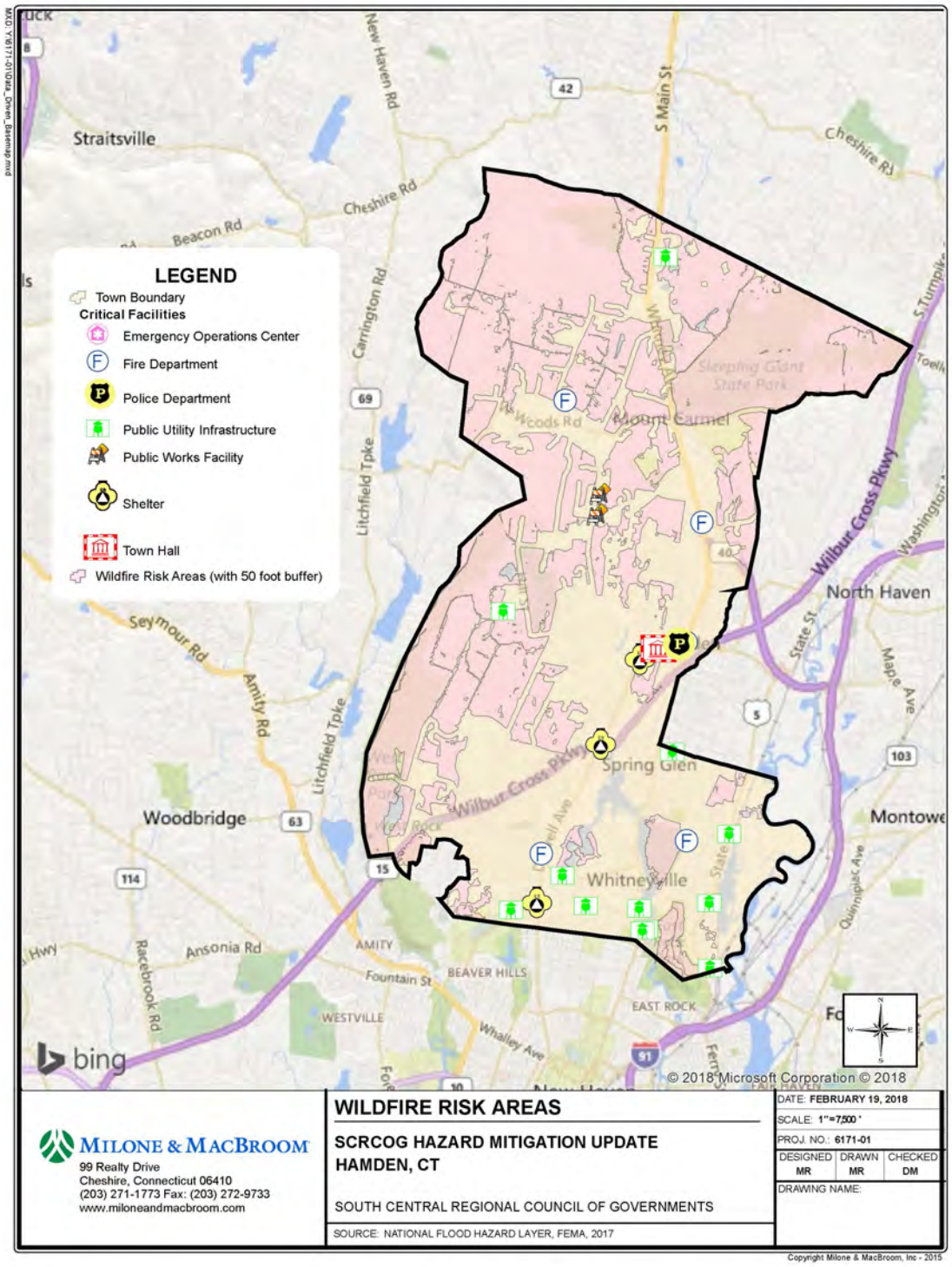


Figure 4-46 Wildfire Map - Hamden

POTENTIAL IMPACTS—HAMDEN

Table 4-80 shows the total estimated value of improved parcels (parcels that contain at least one building), critical facilities, and historic assets that intersect with known hazard areas, as an indicator of the potential impacts should a hazard event occur.

Table 4-80 Potential Impacts by Hazard - Hamden[253]

Hazard	Value of At-Risk Parcels[254]	Value of At-Risk Critical Facilities	Value of At-Risk Historic Assets
Extreme Temperatures	$5,581,505,140	$142,153,000	$117,652,600
Hurricane/Tropical Storm	$5,581,505,140	$142,153,000	$117,652,600
Severe Thunderstorm	$5,581,505,140	$142,153,000	$117,652,600
Severe Winter Storm/Nor'easter	$5,581,505,140	$142,153,000	$117,652,600
Tornado	$5,581,505,140	$142,153,000	$117,652,600
Dam Failure			
High Hazard (Class C)	$126,398,900	$591,080	$4,147,700
Significant Hazard[255] (Class B)	N/A	N/A	N/A
Drought	$5,581,505,140	$142,153,000	$117,652,600
Flood[256][257]			
1-Percent-Annual-Chance	$831,824,800	$117,401,100	$72,192,600
0.2-Percent-Annual-Chance	$614,971,700	$60,697,400	$12,652,500
Category 1 Storm Surge	$17,855,600	$534,200	$4,147,700
Category 2 Storm Surge	$178,585,200	$857,600	$4,147,700
Category 3 Storm Surge	$205,237,900	$834,600	$4,147,700
Category 4 Storm Surge	$126,398,900	$715,300	$4,508,800
Sea Level Rise	$13,241,600	$534,200	$4,147,700
Earthquake	$5,581,505,140	$142,153,000	$117,652,600
Wildfire	$1,463,072,290	$142,153,000	$12,851,500

[253] Potential Impacts are based on parcel exposure, not building exposure. It is possible for a historic asset or critical facility building to not be exposed, yet its associated parcel intersects a hazard area. The parcel value will then be reflected in the Potential Impacts Table.
[254] Based on estimated exposure values from Hazus-MH (building values only).
[255] Dam failure inundation mapping was available for Class C dams. Inundation mapping was not available for other dams located in the town.
[256] Results for the flood hazard are not cumulative. Numbers and values of assets for events of increasing magnitude should be read as "in addition to" the preceding magnitudes.
[257] Results for the hurricane inundation areas are cumulative. Numbers and values of assets for events of increasing magnitude should be read as "consisting of" the preceding magnitudes.

LOSS ESTIMATES—HAMDEN

DETAILED HAZUS-MH LOSS ESTIMATES

Riverine Flood

Estimated building losses for the riverine flood hazard generated by Hazus-MH are broken down into two categories: direct building losses and business interruption losses. The direct building losses are the estimated costs to repair or replace the damage caused to the building and its contents. The business interruption losses are the losses associated with the inability to operate a business because of the damage sustained during the flood. Business interruption losses also include the temporary living expenses for those people displaced from their homes because of the flood (see **Table 4-81**).

Table 4-81 Riverine Flood Loss Estimates (1-Percent-Annual-Chance Flood) - Hamden

	2014 Results Millions of Dollars					2017 Results Millions of Dollars				
	Residential	Commercial	Industrial	Others	Total	Residential	Commercial	Industrial	Others	Total
Direct Building Loss										
Building	$22.18	$7.95	$1.08	$4.93	$36.13	$17.37	$6.04	$1.70	$0.44	$25.54
Contents	$14.45	$20.25	$2.95	$26.27	$63.91	$9.91	$21.72	$2.81	$4.10	$37.55
Inventory	$0	$0.72	$2.02	$0.02	$2.76	$0	$0.15	$0.39	$0.01	$0.55
Subtotal	**$36.63**	**$28.92**	**$6.05**	**$31.22**	**$102.80**	**$27.28**	**$27.91**	**$4.90**	**$3.55**	**$63.36**
Business Interruption										
Income	$0	$0.12	$0.01	$0.01	$0.14	$0	$0.09	$0	$0.01	$0.10
Relocation	$0.02	$0.04	$0.01	$0	$0.06	$0.03	$0.01	$0	$0	$0.04
Rental Income	$0.01	$0.02	$0	$0	$0.03	$0.01	$0.01	$0	$0	$0.01
Wage	$0.01	$0.20	$0.01	$0.09	$0.30	$0.01	$0.14	$0	$0.02	$0.17
Subtotal	**$0.04**	**$0.38**	**$0.03**	**$0.10**	**$0.53**	**$0.04**	**$0.25**	**$0**	**$0.03**	**$0.32**
TOTAL	**$36.67**	**$29.30**	**$6.08**	**$31.32**	**$103.33**	**$27.32**	**$28.16**	**$4.90**	**$3.58**	**$63.95**

In addition, the Hazus-MH model estimates 400 households will be displaced due to the flood. Displacement includes households evacuated from within or very near to the inundated area. Of these, 839 people will seek temporary shelter in public shelters.

These inland flooding results show a decrease in the estimated losses from a 1% annual-chance flood between the previous and the current Hazus-MH results. It is likely that the change in the definitions of inland and coastal flood zones is the primary reason for those differences; in the previous Plan none of Hamden's flood zones were defined as coastal, while in this edition a significant portion of estimated flood losses are expected to be caused by coastal flooding, as described in the next section.

Coastal Flood

Estimated building losses for the coastal flood hazard generated by Hazus-MH are broken down into two categories: direct building losses and business interruption losses. The direct building losses are the estimated costs to repair or replace the damage caused to the building and its contents. The business interruption losses are the losses associated with the inability to operate a business because of the damage sustained during the flood. Business interruption losses also include the temporary living expenses for those people displaced from their homes because of the flood (see Table 4-82).

Table 4-82 Coastal Flood Loss Estimates (100-year Event) – Hamden

	Residential	Commercial	Industrial	Others	Total
Direct Building Loss (millions of dollars)					
Building	$0.54	$3.60	$6.11	$0.27	$10.52
Contents	$0.32	$11.05	$19.78	$1.71	$32.86
Inventory	$0.00	$0.54	$1.88	$0.00	$2.42
Subtotal	**$0.86**	**$15.19**	**$27.77**	**$1.98**	**$45.80**
Business Interruption (millions of dollars)					
Income	$0.00	$0.03	$0.01	$0.00	$0.04
Relocation	$0.00	$0.02	$0.00	$0.00	$0.02
Rental Income	$0.00	$0.01	$0.00	$0.00	$0.01
Wage	$0.00	$0.05	$0.01	$0.03	$0.09
Subtotal	**$0.00**	**$0.10**	**$0.02**	**$0.04**	**$0.16**
TOTAL	**$0.86**	**$15.29**	**$27.79**	**$2.01**	**$45.95**

In addition, the Hazus-MH model estimates 19 households will be displaced due to the flood. Displacement includes households evacuated from within or very near to the inundated area. 14 individuals will seek temporary shelter in public shelters.

Note that in the previous Plan none of Hamden's flood zones were defined as coastal. Taking both coastal and inland flood loss estimates together ($109.9 million), flood loss estimates are nearly the same as in the previous Plan ($103.33 million).

Hurricane Wind

Hazus-MH was used to model probabilistic hurricane wind impacts for the 10-, 20-, 50-, 100-, 200-, 500- and 1,000-year events. These annualized return periods compare to the Saffir-Simpson Scale in the following way:

- 10-year Tropical Depression/Tropical Storm
- 20-year Tropical Storm
- 50-year Tropical Storm/Category 1

- 100-year Category 1/Category 2
- 200-year Category 2
- 500-year Category 3
- 1000-year Category 3

The number of buildings estimated to be damaged and the resulting building-related economic losses are shown in **Table 4-83, Table 4-84,** and **Table** 4-85**.**

Table 4-83 Number of Buildings Damaged - Hamden

	Return Period	Minor	Moderate	Severe	Destruction	Total
2014 Results	10-year	0	0	0	0	0
	20-year	17	1	0	0	18
	50-year	234	19	1	0	254
	100-year	1,289	177	5	1	1,472
	200-year	3,057	694	36	19	3,806
	500-year	5,230	2,199	301	165	7,895
	1,000-year	5,827	3,654	879	508	10,868
2017 Results	10-year	0	0	0	0	0
	20-year	19	1	0	0	20
	50-year	106	8	0	0	114
	100-year	514	62	1	0	577
	200-year	1,450	234	7	1	1,692
	500-year	3,345	812	41	17	4,215
	1,000-year	4,727	1,532	128	58	6,445

Table 4-84 Other Hurricane Impacts - Hamden

	Return Period	Minor	Moderate	Severe	Destruction	Total
2014 Results	10-year	$0	$0	$0	$0	$0
	20-year	$529,690	$0	$0	$0	$529,690
	50-year	$12,063,540	$225,500	$14,410	$198,480	$12,501,930
	100-year	$39,271,380	$2,351,920	$183,600	$1,579,380	$43,386,280
	200-year	$103,094,250	$8,634,550	$1,007,160	$6,795,490	$119,531,450
	500-year	$352,618,530	$32,024,940	$4,889,820	$32,540,960	$422,074,250
	1,000-year	$771,717,370	$86,160,890	$11,243,330	$80,375,980	$949,497,570
2017 Results	10-year	$0	$0	$0	$0	$0
	20-year	$1,430	$0	$0	$0	$1,430
	50-year	$7,781,340	$212,450	$45,140	$51,540	$8,090,470
	100-year	$28,696,080	$922,530	$183,700	$183,900	$29,986,200
	200-year	$62,953,350	$3,603,320	$874,390	$1,005,050	$68,436,110
	500-year	$151,048,850	$12,903,780	$3,784,510	$3,637,320	$171,374,470
	1,000-year	$270,144,650	$26,269,140	$9,623,990	$7,406,420	$313,444,200

Table 4-85 Other Hurricane Impacts - Hamden

	Return Period	Debris Generated (Tons)	Households Displaced	Individuals Seeking Temporary Shelter	Return Period	Debris Generated (Tons)
2014 Results	10-year	0	0	0	10-year	0
	20-year	19	0	0	20-year	19
	50-year	1,264	1	0	50-year	1,264
	100-year	10,396	22	5	100-year	10,396
	200-year	18,770	88	22	200-year	18,770
	500-year	35,679	270	63	500-year	35,679
	1,000-year	58,082	495	116	1,000-year	58,082

Other modeled impacts of this event include the following effects on essential facilities:

- After a 500-year hurricane: 20 of 25 schools are expected to lose at least one day of use.
- After a 1,000-year hurricane: All 25 schools are expected to lose at least one day of use.

These hurricane wind results show a decrease in the loss estimates from high wind events between previous and current Hazus-MH results. The difference in results is most likely explained by incremental improvements in the Hazus-MH program over the last few years.

Earthquake

An earthquake scenario was developed using Hazus-MH that models a magnitude 6.4 earthquake with an epicenter 10 kilometers below East Haddam. The number of buildings estimated to be damaged and the resulting building-related economic losses are shown in **Table 4-86** and Table 4-87**.**

Table 4-86 Number of Buildings Damaged - Hamden

	Slight	Moderate	Extensive	Complete	Total
Count	3,432	1,375	358	82	5,247

Table 4-87 Building-Related Economic Losses - Hamden

	Residential	Commercial	Industrial	Others	Total
Losses	$228,520,000	$167,050,000	$33,840,000	$31,570,000	$460,990,000

Other modeled impacts of this event include:

- Essential Facilities:
  - No essential facilities experience more than 50% damage
  - Following the event, the functionality of essential facilities is as follows:
    - Hospital: no hospitals are located in Hamden
    - Schools: 12 of 25 are more than 50% functional the day after the event
    - Police Stations: zero of one are more than 50% functional the day after the event
    - Fire Stations: Zero of two are more than 50% functional the day after the event
- Transportation Infrastructure:

  - 134 of 142 highway segments are more than 50% functional after one week; total losses to highway bridges are $13.47 million
  - 11 of 58 rail segments will be less than 50% functional for more than one week
  - 2 of 2 light rail segments will be less than 50% functional for more than one week
  - Losses to bus facilities are $170,000
- Utilities:
  - Potable water: 210 pipeline leaks and 53 breaks; total losses are $3.70 million
  - Wastewater: 151 pipeline leaks and 38 breaks; a loss of $680,000
  - Natural gas: 43 pipeline leaks and 11 breaks, a loss of $190,000
  - Communication: damages to facilities equal $60,000
  - 158 households without water service on day one. Full service by day 3.
- Shelter: 470 household will be displaced, with 264 individuals seeking temporary shelter in public shelters
- 16 to 46 individuals may require hospitalization and 4 to 10 individuals may be killed, depending on the time of day the earthquake strikes

ANNUALIZED LOSS ESTIMATES

Table 4-88 shows annualized loss estimates (ALE) for each hazard. Estimates were derived from a number of sources, as described in the Methodology section, and included in column two of the table:

- NFIP: Historic flood insurance claims processed for the community
- PA: Historic Public Assistance grants awarded to the community
- State HMP: Localized estimates based on those presented in the 2014 Connecticut Hazard Mitigation Plan
- HAZUS: Hazus-MH results from modeling performed for this multi-jurisdictional plan
- State HAZUS: Hazus-MH results from modeling performed for the 2014 Connecticut Hazard Mitigation Plan

Hazus-MH results for flooding and earthquake hazards (as run for this multi-jurisdictional plan) were not able to be annualized, and so are not included in the table below.

Table 4-88 Annualized Loss Estimates by Hazard - Hamden

Hazard	Source	Annualized Loss Estimate
Flooding	NFIP	$85,538
	PA	$35,750
	State HMP	$14,035
Hurricane Wind Thunderstorm	HAZUS	$1,479,086
	PA	$17,875
	State HMP	$5,726
Tornado Winter Storm Dam Failure	State HMP	$597,591
	PA	$154,841
	State HMP	$444
	State HMP	$2,435
Wildfire	State HMP	$19,612
Earthquake	State HAZUS	$115,214

PROBLEM STATEMENTS—HAMDEN

Table 4-89 provides statements of particular interest with regard to primary hazards of concern, geographic areas of concern, and vulnerable community assets within the Town of Hamden. If applicable, any noted potential solutions or mitigation actions are discussed with the problem statements.

Table 4-89 Problem Statements - Hamden

Primary Hazards of Concern	
Trees	Tree-related hazards are a recurring issue for the area of town, which is densely forested. Downed trees and power lines during **hurricane/tropical storm** and **severe winter storm** events cause widespread issues for the town due to impacts to transportation and communication infrastructure. Have well over 100 diseased trees. Working collaboratively with United Illuminating to clear trees and branches from wires. Potential solutions/mitigation actions: • Tree pruning, which is routinely being done through the United Illuminating Company's tree service contractor. • Underground utility lines for central business district and densely developed commercial corridors. The Zoning Regulations require underground utility lines for commercial, industrial and residential structures. Set up program to identify diseased trees and replace them with more appropriate species, giving careful consideration to the future impact of climate change.
Riverine Flooding	Large number of rivers, streams and wetlands across town cause varying degrees of flooding concerns – mostly associated with roadway flooding. Very little new development in floodplain areas per regulations. Potential solutions/mitigation actions: • Update FEMA Flood Study to more accurately reflect actual flooding conditions. The central and western portion of Hamden has not been updated using LIDAR data. • Raise Paradise Avenue. Upgrade and maintain the existing storm water drainage system.
Urban Flooding	Many areas subject to stormwater flooding, including along many older watercourses that were filled in over time. • Potential solutions/mitigation actions: perform engineering studies of problem areas and implement recommended solutions. • A recently completed storm drainage infrastructure project has relieved the chronic flooding problem in the Franklin Road/State area.
Geographic Areas of Concern	
	Many of the cul-de-sacs across town are in heavily forested areas that are susceptible to being isolated due to downed trees during high wind events, posing life-safety threats due to no emergency access.
Meadowbrook Park (300	Areas have repeatedly experienced past flooding issues. The Town maintains

units) and low-lying areas along Worth Avenue and Centerbrook Road	a flood control system (diversion/dikes) and pump stations to alleviate flooding issues and to protect Meadowbrook Co-op housing (pre-FIRM structures). The canal here has been cleared and now needs regular maintenance and monitoring. • Potential solutions/mitigation actions: routinely clearing diversion channel.
South of Woodin Street	Floodplain area experiences occasional flooding, especially along Thorpe Drive. This continues to be a problem and New Haven is partly responsible for a solution. • Potential solutions/mitigation actions: encourage property owners to clear stream channels on a routine basis.
Sleeping Giant State Park, Naugatuck State Forest, Brooksvale Recreation Park and SCCRWA watershed lands	Most wildfires occur in Sleeping Giant State Park, which provides some difficulties related to access for fire suppression equipment but does not threaten any structures. Other heavily forested areas in the West and North parts of town are susceptible, including Naugatuck State Forest, Brooksvale Recreation Park and SCCRWA watershed lands which are similarly undeveloped. Potential solutions/mitigation actions: • Completed detailed trail map of Brooksvale Park. • Institute a Forest Management Program.
State Street	Area (mostly industrial) deemed most at risk to the flooding impacts associated with sea level rise. Potential solutions/mitigation actions: Continue enforcement of the Zoning Regulation governing new construction and major renovations in Special Flood Hazard Zones and Coastal Area Management Zone.
Paradise Avenue	Paradise Avenue is largest flooding problem, it floods because of most heavy rainstorms. Potential solutions/mitigation actions: • One solution is to raise the road. • Hiring a consultant to investigate alternatives north of Howard Drive.
Vulnerable Community Assets	
Bridges Across Town	Large number of bridges throughout town crossing waterways (66 that are owned/maintained by Town). They need to be assessed after storm events and the most vulnerable need to be replaced.
Town Buildings	Town buildings are potentially at risk due to heavy snow loads, especially older buildings and those with flat roofs. Needs further study to determine vulnerability, standards for when snow removal is required, and/or where to require more roof pitching.
Quinnipiac University	Quinnipiac University is a significant local asset to the community but not particularly at risk.
Storm Water Pump Station	Storm Water Pump Station – this is very old and in need of repair at a cost of approximately $15 million dollars.
	13 critical facilities are within proximity to either a high hazard or a significant hazard dam. Further study is necessary to determine if a dam failure could potentially impact any of these facilities.
Hamden Mart	Hamden Mart shopping center potentially at risk to flooding – has been evacuated in the past.

CHANGES/IMPROVEMENTS SINCE 2014

- Extensive tree pruning has been carried out.
- Channel maintenance project of the Pardee Brook Box Culvert reduced flooding in the School Street area.
- The emergency back-up generator at the Public Works Garage has now been replaced.
- The emergency back-up generator at Hamden Government Center has also been replaced.
- Farmington Canal Heritage Trail – water follows the old canal bed because it's not filled in, and spreads sideways along channel due to backflow. Portions of the Trail bank have been reinforced.
- Several bridges, including those on Treadwell St., Johnson Rd. Hillfield Rd. and Tuttle St. have been replaced. The Skiff St. Bridge over the Mill River is now being replaced. All bridges in Hamden were recently evaluated 2010-2012.
- Drainage improvements in the Franklin Rd./State St. have alleviated flooding in the vicinity.

MADISON

CRITICAL FACILITIES – MADISON

Table 4-90 contains a list of critical facilities provided by the Town of Madison. These are depicted on **Figure 4.34** along with FEMA flood zones.

Table 4-90 Critical Facilities – Madison

Facility	Location	Emergency Power Supply?	Shelter?	In Floodplain or Coastal Flood Hazard Area?	In Surge Zones?
Emergency Services					
Ambulance	9 Old Rt, 79	Yes	N/A	N/A	N/A
Police	9 Campus Dr	Yes	N/A	N/A	N/A
Firehouse	665 Boston Post Rd.	Yes	N/A	N/A	N/A
Firehouse	864 Opening Hill Rd.	Yes	N/A	N/A	N/A
Emergency Operations Center	8 Campus Dr.	Yes	N/A	N/A	N/A
Municipal Facilities					
Town Campus	8 Campus Dr.	Yes	Yes (gym)	N/A	N/A
High School	286 Green Hill Rd.	Yes	N/A	N/A	N/A
Town Garage	16 Fort Path Rd.	Yes	No	N/A	N/A
Public Works	8 Campus Dr./16 Fort Path Rd.	Yes	No	N/A	N/A
Shelters					
Gym in Town Campus	N/A	Yes	Yes	N/A	N/A
North Madison Congregational Church	1271 Durham Rd.	Yes	No	N/A	N/A
Other Infrastructure and Facilities					

Facility	Location	Emergency Power Supply?	Shelter?	In Floodplain or Coastal Flood Hazard Area?	In Surge Zones?
Madison House Nursing Center	34 Wildwood Rd.	Yes	No	N/A	N/A
Watrous Nursing Center	9 Neck Rd.	Yes	No	N/A	N/A
I-95 Rest Stops	Several	Yes	N/A	N/A	N/A

VULNERABLE ASSETS—MADISON

Vulnerable assets were identified by intersecting GIS-based asset inventories and demographic data with known hazard boundaries to determine the number of parcels, buildings, critical facilities, historic assets, and populations exposed to each hazard. This results in an estimation of vulnerable assets by hazard as shown in Table 4-91**. Figure 4-47** depicts critical facilities in Madison **while Figure 4-48** depicts the locations of historic resources.

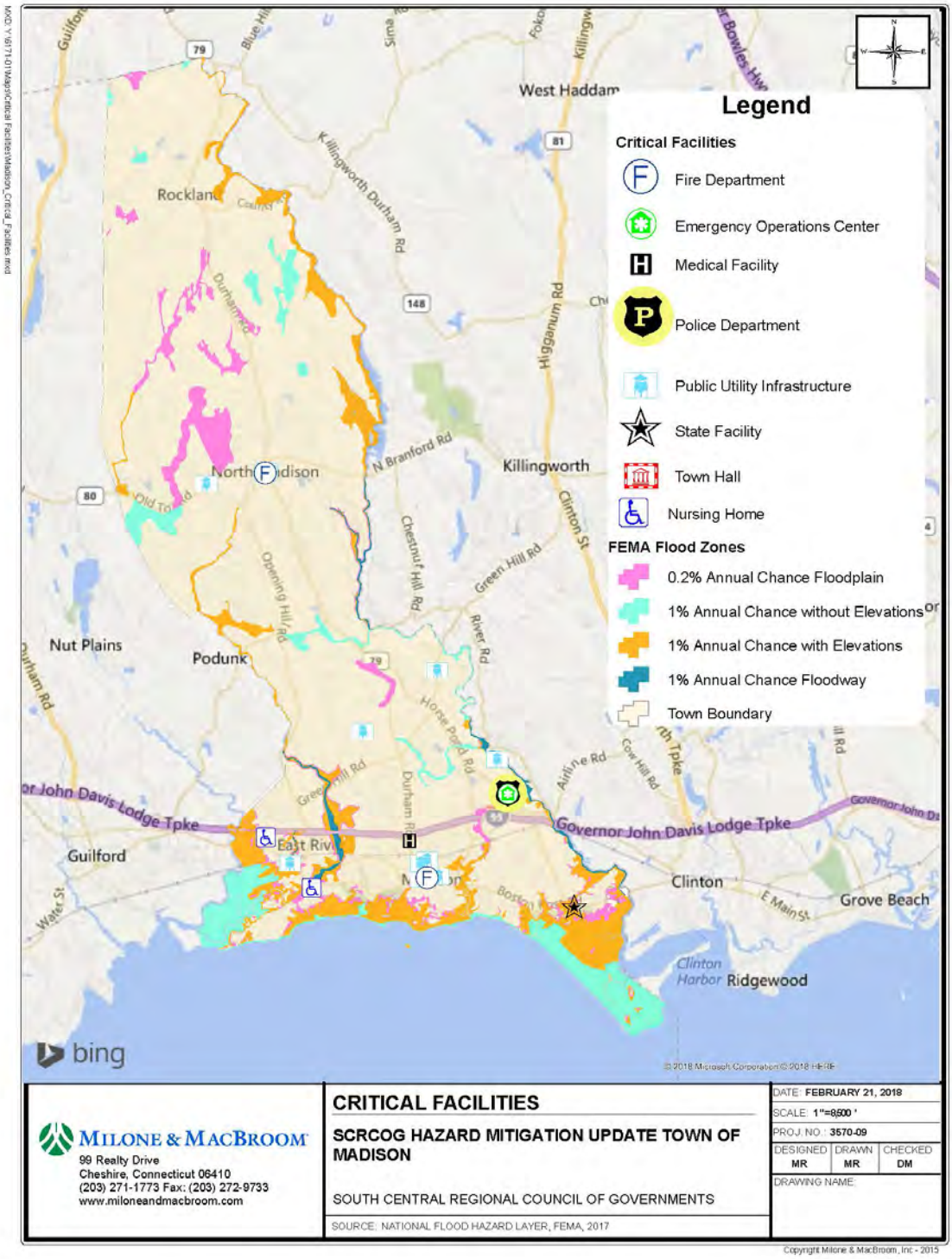


Figure 4-47 Critical Facilities and SFHA Map - Madison

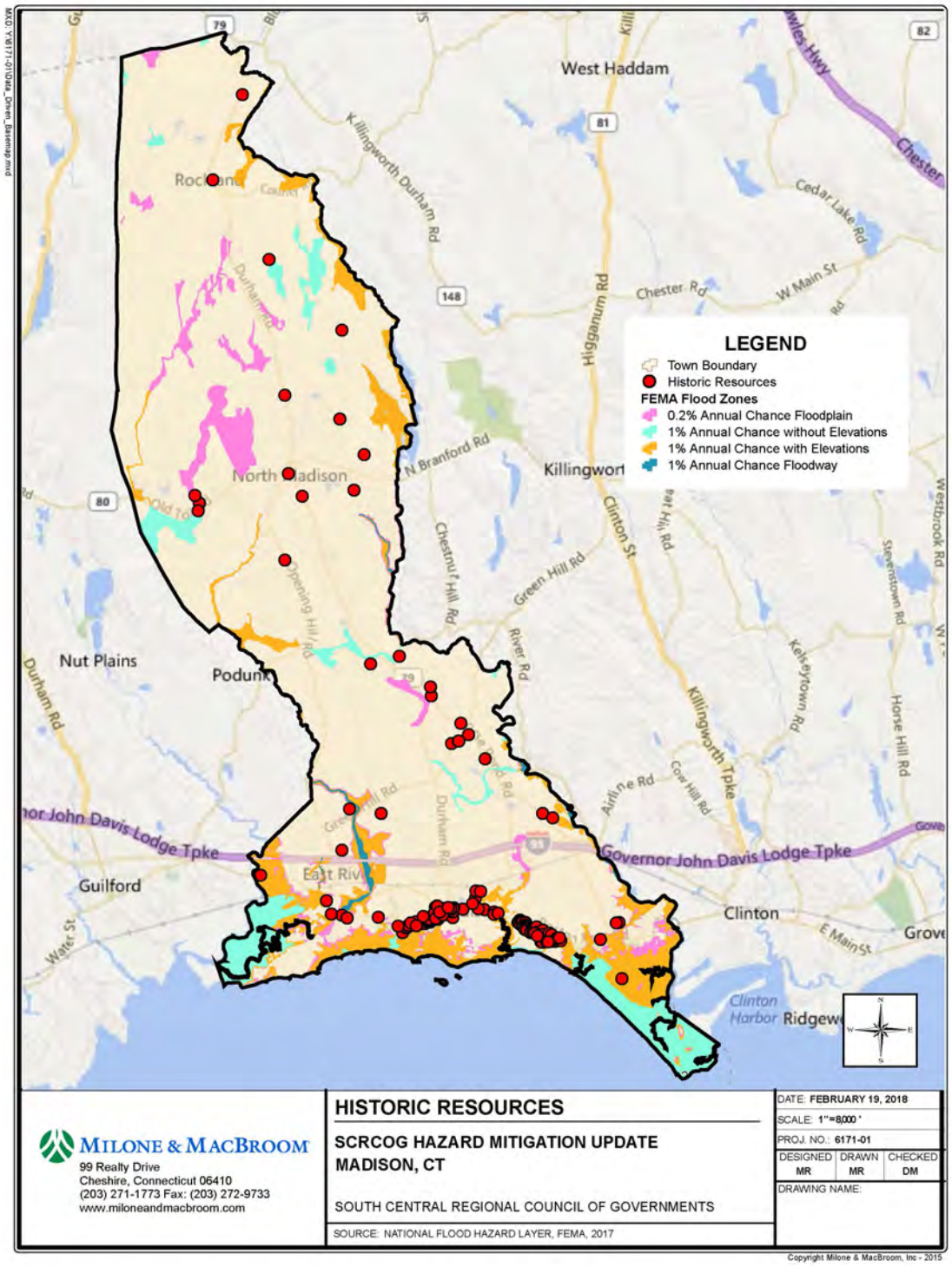


Figure 4-48 Historic Resources Map - Madison

Table 4-91 Vulnerable Assets by Hazard - Madison

Hazard	Number of Parcels[258]	Number of Buildings[259]	Critical Facilities[260]	Historic Assets[261]	Population[262]
Extreme Temperatures	8,530	9,317	14	190	3,325
Hurricane/Tropical Storm	8,530	9,317	14	190	18,269
Severe Thunderstorm	8,530	9,317	14	190	18,269
Severe Winter Storm/Nor'easter	8,530	9,317	14	190	18,269
Tornado	8,530	9,317	14	190	18,269
Coastal Erosion[263]	134	110	1	0	250
Dam Failure[264]					
High Hazard (Class C)	325	110	0	0	250
Significant Hazard (Class B)	N/A	N/A	N/A	N/A	N/A
Drought	8,530	9,317	14	190	3,325
Flood[265]					
1-Percent-Annual-Chance	1,830	1,009	2	11	2,290
0.2-Percent-Annual-Chance	986	586	0	5	1,330
Category 1 Storm Surge	429	138	0	0	974
Category 2 Storm Surge	1,345	296	1	1	3,053
Category 3 Storm Surge	1,554	684	1	10	3,527
Category 4 Storm Surge	1,381	886	0	1	3,135
Sea Level Rise	1,362	897	3	4	3,092
Earthquake	543	855	0	0	2,009
Wildfire	8,530	9,317	3	190	18,269

REPETITIVE LOSS AND SEVERE REPETITIVE LOSS PROPERTIES

In addition to the spatial analysis conducted above, summary information for repetitive flood loss and severe repetitive flood loss properties within the Town of Madison also provides an indication of vulnerable assets, especially with regard to properties insured under the National Flood Insurance Program that have experienced repeated flooding (see Table 4-92**).**[266]

[258] Based on data provided by the Town of Madison.
[259] Based on building numbers from CT ECO.
[260] Based on a combination of data from Hazus-MH and SCRCOG.
[261] Data for historic assets was not available at the time of this analysis.
[262] Based on population numbers from 2010 census data.
[263] Coastal Erosion Hazard determined using Analysis of Shoreline Change in Connecticut - published by DEEP, Sea Grant, and UConn/CLEAR
[264] Dam failure inundation mapping was available for Class C dams. Inundation mapping was not available for other dams located in the town.
[265] Results for the flood hazard are not cumulative. Numbers and values of assets for events of increasing magnitude should be read as "in addition to" the preceding magnitudes.
[266] Based on information provided by the Federal Emergency Management Agency current as of 12/31/2012.

Table 4-92 Repetitive Flood Loss and Severe Repetitive Flood Loss Summary - Madison

	Number of Losses	Number of Properties	Building Payments	Contents Payments	Total Payments
Repetitive Loss	221	87	$6,419,887	$246,692	$6,666,579
Severe Repetitive Loss	10	2	$717,446	$125,652	$843,099

The majority of the RL properties are single-family homes. Three are residential condominium units and one is a multi-family home. Only three RL properties are non-residential. One of the three appears to be commercial, and two are town-owned recreational facilities.

As of December 31, 2012, the Town of Madison had a total of 573 claims totaling $8,689,427 in losses for all NFIP-insured structures. By July 31, 2017, that number had grown to 578 claims totaling $11,270,942.

Figure 4-49 through **Figure 4-52** show dams, storm surge, sea level rise, and wildfire hazard areas within the Town of Madison.

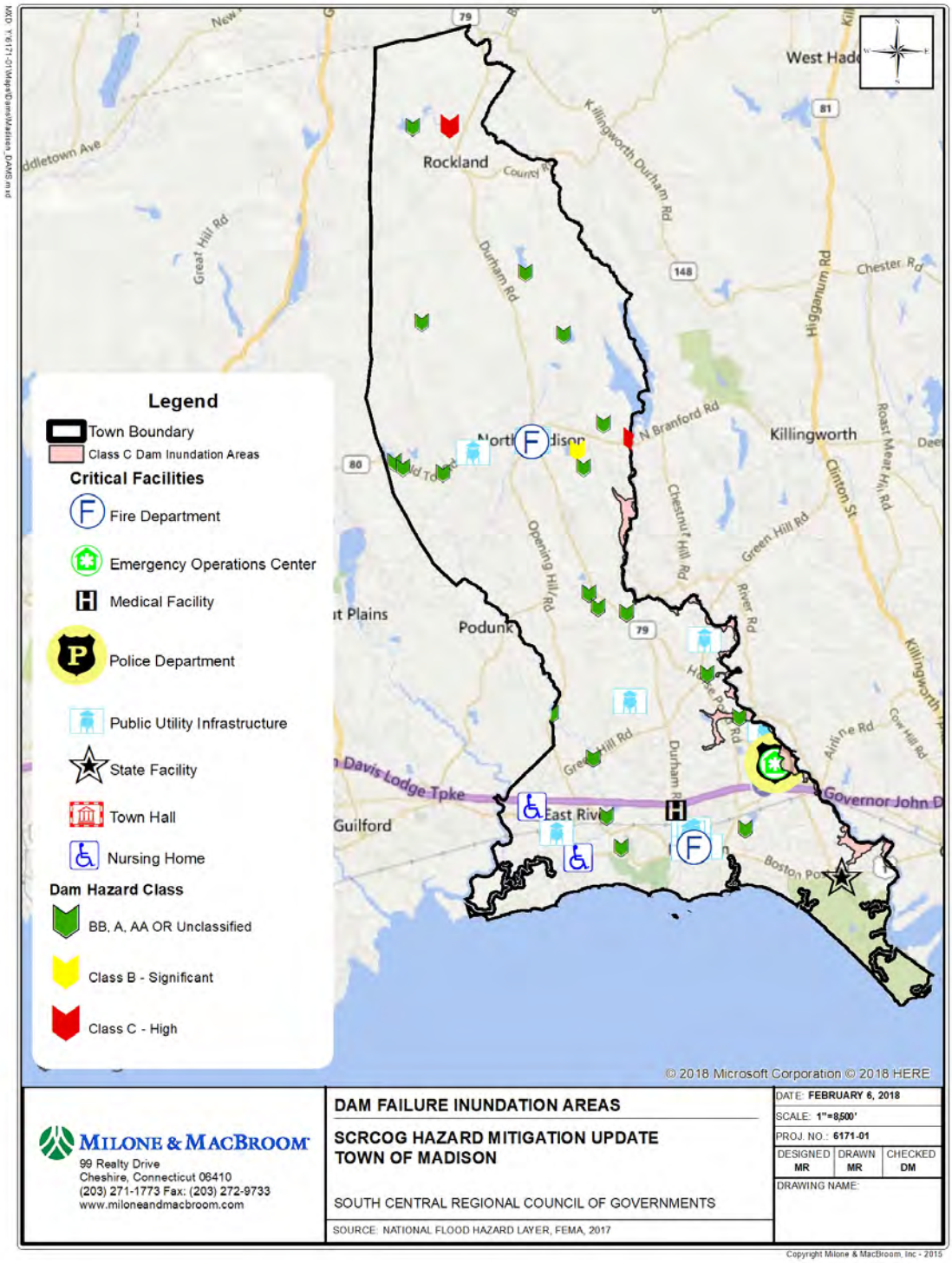


Figure 4-49 Dams Map - Madison

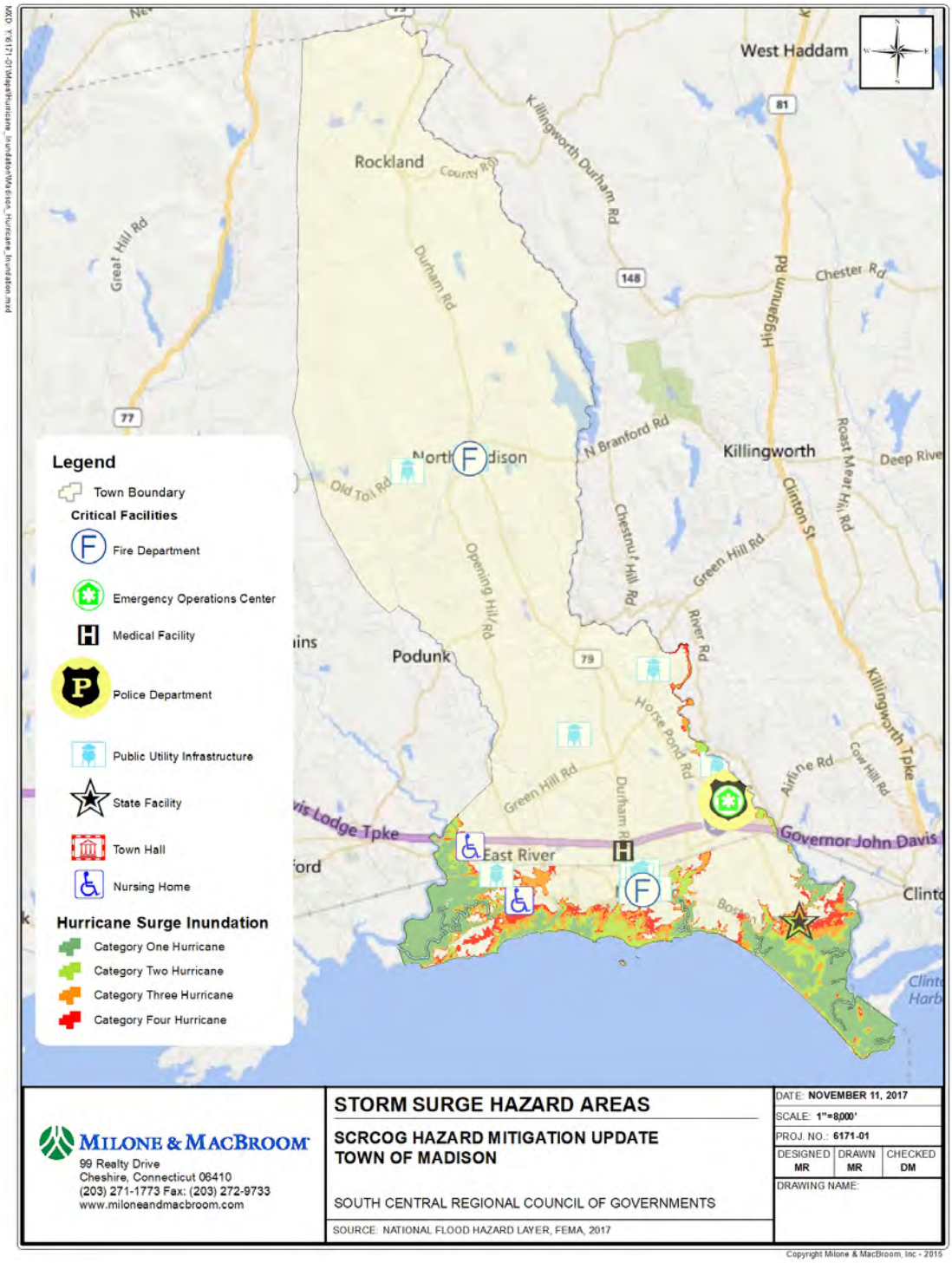


Figure 4-50 Hurricane Inundation Map - Madison

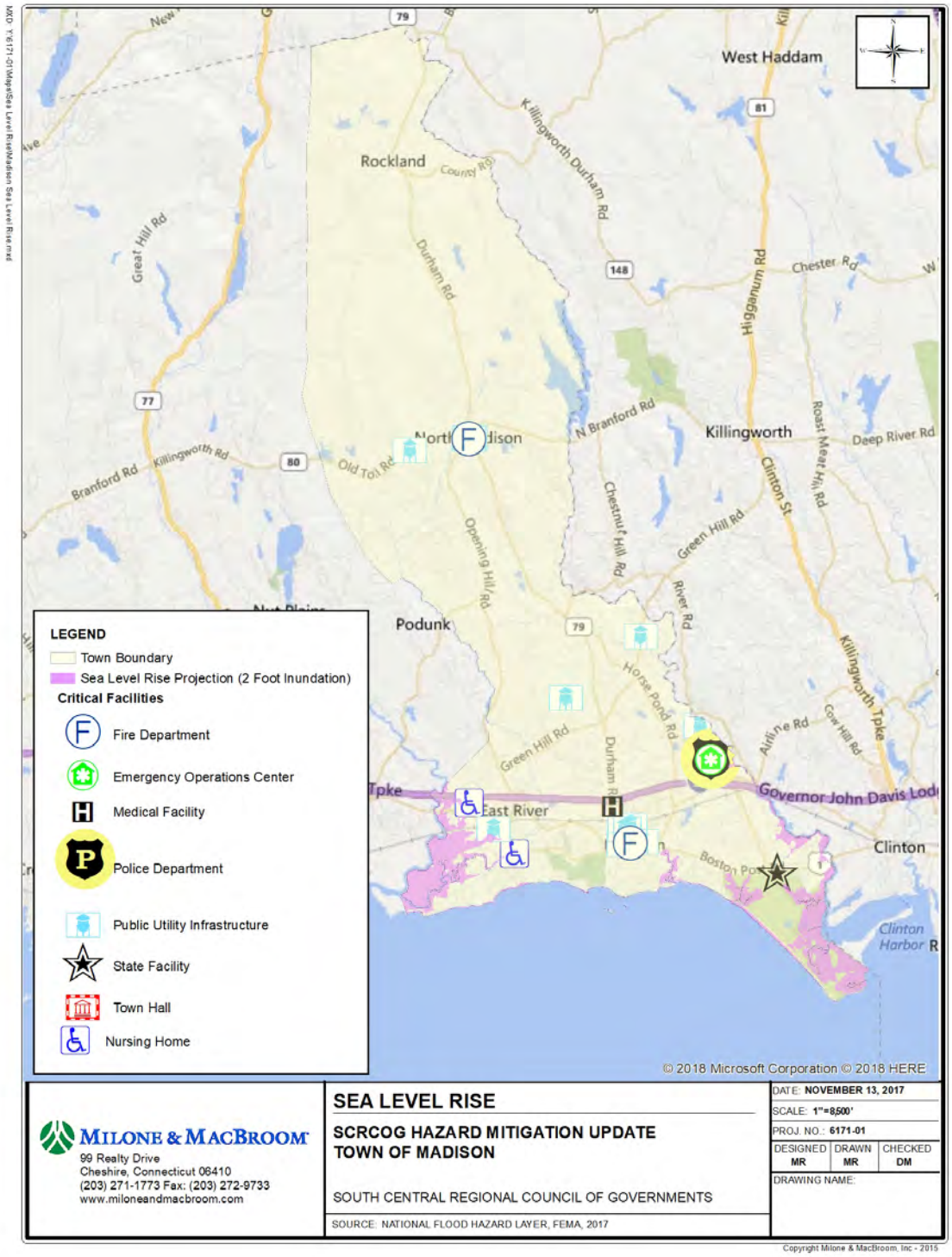


Figure 4-51 Sea Level Rise Map - Madison

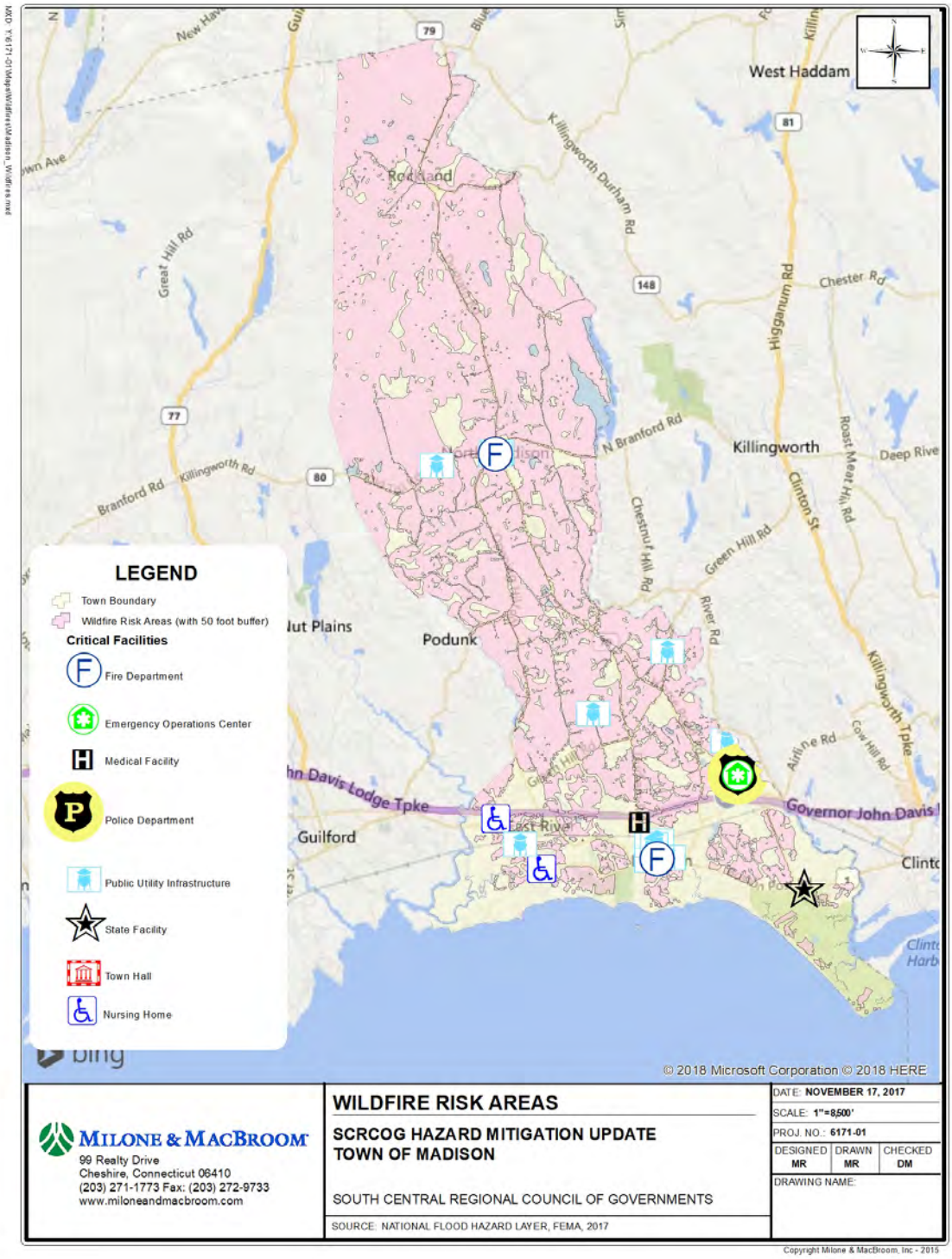


Figure 4-52 Wildfire Map - Madison

POTENTIAL IMPACTS—MADISON

Table 4-93 shows the total estimated value of improved parcels (parcels that contain at least one building), critical facilities, and historic assets that intersect with known hazard areas, as an indicator of the potential impacts should a hazard event occur.

Table 4-93 Potential Impacts by Hazard - Madison[267]

Hazard	Value of At-Risk Parcels[268]	Value of At-Risk Critical Facilities[269]	Value of At-Risk Historic Assets
Extreme Temperatures	$4,276,520,300	$15,999,300	$242,255,900
Hurricane/Tropical Storm	$4,276,520,300	$15,999,300	$242,255,900
Severe Thunderstorm	$4,276,520,300	$15,999,300	$242,255,900
Severe Winter Storm/Nor'easter	$4,276,520,300	$15,999,300	$242,255,900
Tornado	$4,276,520,300	$15,999,300	$242,255,900
Coastal Erosion[270]	$385,447,700	$0	$140,282,100
Dam Failure			
High Hazard	$117,175,400	$9,996,200	$9,996,200
Significant Hazard[271]	N/A	N/A	N/A
Drought	$4,276,520,300	$15,999,300	$242,255,900
Flood[272][273]			
1-Percent-Annual-Chance	$1,400,581,700	$10,286,600	$168,886,600
0.2-Percent-Annual-Chance	$787,087,700	$10,286,600	$172,572,800
Zone VE	$551,483,700	$0	$140,282,100
Category 1 Storm Surge	$740,298,300	N/A	$153,197,000
Category 2 Storm Surge	$1,015,997,500	N/A	$158,837,100
Category 3 Storm Surge	$1,042,587,700	N/A	$164,882,900
Category 4 Storm Surge	$961,255,300	N/A	$172,205,700
Sea Level Rise	$533,452,200	N/A	$150,760,700
Earthquake	$4,276,520,300	N/A	$242,255,900
Wildfire	$1,089,172,900	N/A	$169,253,300

[267] Potential Impacts are based on parcel exposure, not building exposure. It is possible for a historic asset or critical facility building to not be exposed, yet its associated parcel intersects a hazard area. The parcel value will then be reflected in the Potential Impacts Table.
[268] Based on estimated exposure values from Hazus-MH (building values only).
[269] Based on estimated building values from Hazus-MH.
[270] Coastal Erosion Hazard determined using Analysis of Shoreline Change in Connecticut - published by DEEP, Sea Grant, and UConn/CLEAR
[271] Dam failure inundation mapping was available for Class C dams. Inundation mapping was not available for other dams located in the town.
[272] Results for the flood hazard are not cumulative. Numbers and values of assets for events of increasing magnitude should be read as "in addition to" the preceding magnitudes.
[273] Results for the hurricane inundation areas are cumulative. Numbers and values of assets for events of increasing magnitude should be read as "consisting of" the preceding magnitudes.

LOSS ESTIMATES—MADISON

DETAILED HAZUS-MH LOSS ESTIMATES

Riverine Flood

Estimated building losses for the riverine flood hazard generated by Hazus-MH are broken down into two categories: direct building losses and business interruption losses. The direct building losses are the estimated costs to repair or replace the damage caused to the building and its contents. The business interruption losses are the losses associated with the inability to operate a business because of the damage sustained during the flood. Business interruption losses also include the temporary living expenses for those people displaced from their homes because of the flood (see **Table 4-94**).

Table 4-94 Riverine Flood Loss Estimates (1-Percent-Annual-Chance Flood) - Madison

	2014 Results Millions of Dollars					2017 Results Millions of Dollars				
	Residential	Commercial	Industrial	Others	Total	Residential	Commercial	Industrial	Others	Total
Direct Building Loss										
Building	$17.76	$5.07	$0.75	$0.69	$24.27	$13.78	$0.90	$0.19	$0.20	$15.06
Contents	$9.66	$14.93	$1.42	$3.59	$29.60	$5.87	$1.95	$0.38	$1.30	$9.50
Inventory	$0	$0.46	$0.18	$0.03	$0.67	$0.00	$0.02	$0.03	$0.00	$0.05
Subtotal	**$27.42**	**$20.46**	**$2.35**	**$4.31**	**$54.54**	**$19.65**	**$2.86**	**$0.60**	**$1.50**	**$24.61**
Business Interruption										
Income	$0	$0.07	$0	$0.01	$0.08	$0.00	$0.00	$0.00	$0.00	$0.00
Relocation	$0.02	$0.02	$0	$0	$0.04	$0.01	$0.00	$0.00	$0.00	$0.01
Rental Income	$0	$0.01	$0	$0	$0.01	$0.00	$0.00	$0.00	$0.00	$0.00
Wage	$0	$0.07	$0	$0.08	$0.15	$0.00	$0.00	$0.00	$0.03	$0.03
Subtotal	**$0.02**	**$0.17**	**$0**	**$0.09**	**$0.28**	**$0.02**	**$0.00**	**$0.00**	**$0.03**	**$0.04**
TOTAL	**$27.44**	**$20.63**	**$2.35**	**$4.40**	**$54.82**	**$19.66**	**$2.86**	**$0.60**	**$1.53**	**$24.65**

Coastal Flood

Estimated building losses for the coastal flood hazard generated by Hazus-MH are broken down into two categories: direct building losses and business interruption losses. The direct building losses are the estimated costs to repair or replace the damage caused to the building and its contents. The business interruption losses are the losses associated with the inability to operate a business because of the damage sustained during the flood. Business interruption losses also include the temporary living expenses for those people displaced from their homes because of the flood (see **Table 4-95**).

Table 4-95 Coastal Flood Loss Estimates (100-year Event) - Madison

	2012 Results Millions of Dollars					2017 Results Millions of Dollars				
	Residential	Commercial	Industrial	Others	Total	Residential	Commercial	Industrial	Others	Total
Direct Building Loss										
Building	$3.37	$0.33	$0.02	$0.02	$3.74	$48.82	$8.49	$1.54	$0.51	$59.36
Contents	$2.29	$0.83	$0.46	$0.18	$3.76	$45.16	$25.55	$3.54	$3.15	$77.40
Inventory	$0	$0.01	$0.06	$0	$0.07	$0.00	$0.44	$0.41	$0.03	$0.89
Subtotal	**$5.66**	**$1.17**	**$54**	**$20**	**$7.57**	**$93.98**	**$34.48**	**$5.48**	**$3.70**	**$137.64**
Business Interruption										
Income	$0	$0.02	$0	$0	$0.02	$0.00	$0.16	$0.00	$0.00	$0.17
Relocation	$0.01	$0	$0	$0	$0.01	$0.10	$0.02	$0.00	$0.00	$0.13
Rental Income	$0	$0	$0	$0	$0	$0.02	$0.02	$0.00	$0.00	$0.04
Wage	$0	$0.02	$0	$0	$0.02	$0.01	$0.14	$0.00	$0.02	$0.16
Subtotal	**$0.01**	**$0.04**	**$0**	**$0**	**$0.05**	**$0.13**	**$0.34**	**$0.00**	**$0.03**	**$0.49**
TOTAL	**$5.67**	**$1.21**	**$54**	**$20**	**$7.62**	**$94.11**	**$34.81**	**$5.48**	**$3.73**	**$138.13**

In addition, the Hazus-MH model estimates 446 households will be displaced due to the flood. Displacement includes households evacuated from within or very near to the inundated area. Of these, 1,011 people will seek temporary shelter in public shelters.

These coastal flooding results show a very significant increase in the estimated losses from a 1% annual-chance flood between the previous and the current Hazus-MH results. It is likely that the change in the definitions of inland and coastal flood zones is one primary reason for those differences; in fact, while the coastal flood damage estimates listed above have increased since the previous Plan, inland flood damage estimates (provided in the previous section) have decreased very significantly. The New Haven County Flood Insurance Rate Map revision of 2017 may have also contributed to the difference in results.

Hurricane Wind

Hazus-MH was used to model probabilistic hurricane wind impacts for the 10-, 20-, 50-, 100-, 200-, 500- and 1,000-year events. These annualized return periods compare to the Saffir-Simpson Scale in the following way:

- 10-year Tropical Depression/Tropical Storm
- 20-year Tropical Storm
- 50-year Tropical Storm/Category 1
- 100-year Category 1/Category 2
- 200-year Category 2
- 500-year Category 3
- 1000-year Category 3

The number of buildings estimated to be damaged and the resulting building-related economic losses are shown in **Table 4-96** and **Table 4-97.**

Table 4-96 Number of Buildings Damaged - Madison

	Return Period	Minor	Moderate	Severe	Destruction	Total
2014 Results	10-year	0	0	0	0	0
	20-year	7	0	0	0	7
	50-year	225	11	0	0	236
	100-year	914	101	5	2	1,022
	200-year	1,887	422	51	30	2,390
	500-year	2,897	1,179	290	176	4,542
	1,000-year	3,046	1,779	641	424	5,890
2017 Results	10-year	0	0	0	0	0
	20-year	3	0	0	0	3
	50-year	87	3	0	0	90
	100-year	420	29	1	0	450
	200-year	1,034	138	7	5	1,184
	500-year	2,108	468	49	28	2,653
	1,000-year	2,568	797	142	87	3,594

Table 4-97 Building-Related Economic Losses - Madison

	Return Period	Minor	Moderate	Severe	Destruction	Total
2014 Results	10-year	$0	$0	$0	$0	$0
	20-year	$1,016,050	$37,840	$5,280	$5,130	$1,064,300
	50-year	$9,451,150	$434,070	$36,860	$59,510	$9,981,590
	100-year	$23,781,290	$1,987,070	$244,510	$337,830	$26,350,700
	200-year	$67,209,750	$7,644,630	$1,231,800	$1,310,180	$77,396,360
	500-year	$208,661,100	$27,964,810	$4,661,670	$3,949,300	$245,236,880
	1,000-year	$396,124,810	$57,885,210	$9,347,220	$7,580,060	$470,937,300
2017 Results	10-year	$0	$0	$0	$0	$0
	20-year	$522,740	$0	$0	$0	$522,740
	50-year	$7,730,600	$171,820	$19,040	$24,720	$7,946,180
	100-year	$20,042,130	$950,250	$101,020	$163,440	$21,256,840
	200-year	$42,812,650	$3,396,420	$452,290	$628,910	$47,290,270
	500-year	$108,371,970	$9,950,910	$1,658,360	$1,849,100	$121,830,350
	1,000-year	$ 194,624,340	$ 20,664,300	$ 3,517,950	$ 3,301,660	$ 222,108,260

Additionally, shelter needs and debris generation are modeled by Hazus-MH. Results are in **Table 4-98.**

Table 4-98 Other Hurricane Impacts - Madison

Return Period	Households Displaced	Individuals Seeking Temporary Shelter	Debris (Tons)
10-year	0	0	0
20-year	215	0	0
50-year	2,380	0	0

Return Period	Households Displaced	Individuals Seeking Temporary Shelter	Debris (Tons)
100-year	13,638	2	0
200-year	20,513	13	2
500-year	46,072	54	9
1,000-year	65,345	131	24

Other modeled impacts of this event include the following effects on essential facilities:

- After a 200-year hurricane, two of eleven schools will lose at least one day of use.
- After a 500-year hurricane, all eleven schools are expected to lose at least one day of use.
- After a 1,000-year hurricane, all eleven schools are expected to lose at least one day of use.

These hurricane wind results show a decrease in the losses from high wind events between previous and current Hazus-MH results. The difference in results is most likely explained by incremental improvements in the Hazus-MH program over the last few years.

Earthquake

An earthquake scenario was developed using Hazus-MH that models a magnitude 6.4 earthquake with an epicenter 10 kilometers below East Haddam. The number of buildings estimated to be damaged and the resulting building-related economic losses are shown in **Table 4-99** and **Table 4-100**.

Table 4-99 Number of Buildings Damaged - Madison

	Slight	Moderate	Extensive	Complete	Total
Count	2,344	1,189	406	201	4,140

Table 4-100 Building-Related Economic Losses – Madison (Millions)

	Slight	Moderate	Extensive	Complete	Total
Losses	$181.07	$223.46	$34.27	$30.74	$469.55

Other modeled impacts of this event include:

- Essential Facilities:
  - Seven of eleven schools may experience at least moderate damage
  - One of one police station may experience at least moderate damage
  - One of two fire station may experience at least moderate damage
  - Following the event, the functionality of essential facilities is as follows:
    - Schools: zero of eleven are more than 50% functional the day after the event
    - Police Stations: zero of one is more than 50% functional the day after the event
    - Fire Stations: zero of two are more than 50% functional the day after the event
- Transportation Infrastructure:
  - All 21 highway segments are more than 50% functional after one week
  - 11 of 29 highway bridge experiences at least moderate damage; 18 are more than 50% functional on day one, 26 after one week; total losses are $57.61 million
  - One of two light rail segments are more than 50% functional after one week; total losses are $580,000

- Utilities:
  - Potable water pipelines: 144 leaks and 36 breaks. Total water system losses are $650,000
  - Wastewater pipelines: 103 leaks and 26 breaks, a loss of $470,000
  - Natural gas pipelines: 30 leaks and 7 breaks, a loss of $130,000
  - 137 households lose potable water service on day one; all service is restored by day three
  - The number of households without service is: 3,378 on day one, 2,630 by day three, 412 by day one, 46 by day thirty, and 5 by day ninety
- Shelter: 141 household will be displaced, with 66 individuals seeking temporary shelter in public shelters
- 10 to 83 individuals may require hospitalization and 2 to 22 individuals may be killed, depending on the time of day the earthquake strikes

ANNUALIZED LOSS ESTIMATES

Table 4-101 shows annualized loss estimates (ALE) for each hazard. Estimates were derived from a number of sources, as described in the Methodology section, and included in column two of the table:

- NFIP: Historic flood insurance claims processed for the community
- PA: Historic Public Assistance grants awarded to the community
- State HMP: Localized estimates based on those presented in the 2014 Connecticut Hazard Mitigation Plan
- HAZUS: Hazus-MH results from modeling performed for this multi-jurisdictional plan
- State HAZUS: Hazus-MH results from modeling performed for the 2014 Connecticut Hazard Mitigation Plan

Hazus-MH results for flooding and earthquake hazards (as run for this multi-jurisdictional plan) were not able to be annualized, and so are not included in the table below.

Table 4-101 Annualized Loss Estimates by Hazard - Madison

Hazard	Source	Annualized Loss Estimate
Flooding	NFIP	$288,999
	PA	$54,966
	State HMP	$4,170
Hurricane Wind Thunderstorm	HAZUS	$1,105,244
	PA	$27,483
	State HMP	$1,702
Tornado Winter Storm Dam Failure	State HMP	$177,572
	PA	$23,406
	State HMP	$132
	State HMP	$724
Wildfire	State HMP	$21,645
Earthquake	State HAZUS	$34,235

PROBLEM STATEMENTS—MADISON

Table 4-102 provides statements of particular interest with regard to primary hazards of concern, geographic areas of concern, and vulnerable community assets within the Town of Madison. If applicable, any noted potential solutions or mitigation actions are discussed with the problem statements.

Table 4-102 Problem Statements – Madison

Primary Hazards of Concern	
Trees	Trees – concern for blocked roads and power outages. Have not had many diseased trees, but this is being monitored
Coastal Flooding, Coastal Erosion, Sea Level Rise	Coastal flooding (storm-related and often resulting from high tides), coastal erosion and sea level rise. Recurring coastal flood problems cause many low-lying areas to be cut off and isolated from rest of community. The Town maintains a list of pre-identified areas of concern. Homes constructed or rebuilt to new FEMA standards have done well in recent storm events (breakaway walls functioned as designed, no finished floor flooding).
Hurricane/Tropical Storm	Hurricane/tropical storm hazards pose significant issues for the Town related to coastal flood damages (to homes and infrastructure, including seawalls), street flooding, and inland wind damages to trees, power lines, and communications (e.g., cell towers). • Potential solutions/mitigation actions: strengthen communication networks, including provision of back-up generator power for cell towers.
Severe Winter Storms/Ice Storms	Severe winter storms/ice storms are a significant concern, especially when causing power failures during period of extreme cold (life/safety threat) and when downing trees (transportation/access concerns, with potential for many isolated residents). Roof collapse due to heavy snow loads is also a potential threat for some structures.
Geographic Areas of Concern	
Circle Beach Road	Circle Beach Road – numerous homes at risk to regular coastal/tidal flooding and storm surge. Many have been damaged or destroyed in past storms, and most of those remaining or that were rebuilt are elevated with breakaway walls in accordance with FEMA standards.
Middle Beach Road	Middle Beach Road – area susceptible to coastal flooding and storm surge. Protected by 800-foot armored stone wall that was heavily damaged following Hurricane Irene in 2011. Town is applying for repair/redesign and reconstruction of revetment through FEMA grants (Public Assistance).
Hammonasset State Park	Hammonasset State Park – can double the Town's population on a summer weekend day, creating life/safety concerns about severe thunderstorms and tornadoes. Potential solutions/mitigation actions: • Town has adopted policies to clear the beach. • Town has lightning prediction/alarm system in place. • Training/exercising
Hartford Avenue	Hartford Avenue – significant erosion concern for bluffs along the Sound
Tibbals Bridge Road	Tibbals Bridge Road – occasional flooding of basements (approx. 30 homes in area).
	Low-lying neighborhoods that frequently become isolated by tidal/coastal flooding occurrences include areas along Neck Road, the west end of Green Hill Road, Harbor Avenue, and Circle Beach Road.
Fence Creek	Fence Creek at Seaview Avenue floods
Intersection at Garrett Park	Intersection at Garrett Park floods
Railway underpass near Nathan's Lane	Railway underpass near Nathan's Lane on Rt. 1 floods
Vulnerable Community Assets	
Surf Club	Surf Club (Town-owned beach and recreation area) – 45-acre park is vulnerable to coastal flooding and storm surge. Failure of seawall and loss of primary frontal dunes during Irene. Potential solutions/mitigation actions: beach dune restoration (ongoing).
Town Campus	Town Campus (Town Hall, Police, EOC, community shelter (gym), etc.) is a critical lifeline for the continuity of government for the Town. Area is in proximity to special flood hazard area for Hammonasset River and is downstream from Lake Hammonasset Dam (high hazard dam, owned by RWA). Should be considered for

	possible mitigation actions. Town's school bus parking facility is in special flood hazard area.
East Wharf and West Wharf	East Wharf and West Wharf are Town Beaches/Assets that have been damaged in the past.
Critical Facilities	2 critical facilities are within proximity to a significant hazard dam. Further study is necessary to determine if a dam failure could potentially impact either or both facilities. 1 critical facility is in a Category 4 storm surge inundation zone.

CHANGES/IMPROVEMENTS SINCE 2014

- The Town of Madison has updated the equipment in the Police Department's Dispatch Center, erected a new emergency communications radio tower at the Town Campus, and installed roof-top solar panels on various town and school buildings.

MILFORD

CRITICAL FACILITIES – MILFORD

Table 4-103 contains a list of critical facilities provided by the City of Milford. These are depicted on **Figure 4-53** along with FEMA flood zones.

Table 4-103 Critical Facilities – Milford

Facility	Location	Emergency Power Supply?	Shelter?	In Floodplain or Coastal Flood Hazard Area?	In Surge Zones?
Emergency Services					
Fire HQ	72 New Haven Ave	Yes	No	No	No
East Side Fire Station	980 New Haven Ave	Yes	No	No	No
North Side Fire Station	55 Wheelers Farms Rd	Yes	No	No	No
West Side Fire Station	349 Naugatuck Ave	Yes	No	No	No
Police Station/EOC	430 Boston Post Rd	Yes	No	No	No
Municipal Facilities					
Milford Health Department	82 New Haven Ave	Yes	No	No	No
City Hall	110 River St	N/A	No	Yes	Yes
Parsons Government Center	70 West River St	N/A	No	No	No
Public Works Building	83 Ford St	Yes	No	No	No
Shelters		N/A			
Jonathan Law High School	20 Lansdale Ave	Yes	Yes	No	Yes
Milford Senior Center	9 Jepson Dr	Yes	Secondary	No	No
Health Care and Senior Living Facilities					
Milford Hospital	300 Seaside Ave	Yes	No	No	No
West River Healthcare Center	245 Orange Ave	Yes	No	No	No
Golden Hill Rehab	2028 Bridgeport	Yes	No	No	No

Facility	Location	Emergency Power Supply?	Shelter?	In Floodplain or Coastal Flood Hazard Area?	In Surge Zones?
	Ave				
Milford Health and Rehabilitation	195 Platt St	Yes	No	No	No
Carriage Green	77 Plains Rd	N/A	No	No	No
Four Corner's Rest Home	306 Naugatuck Ave	N/A	No	No	No
Acord Inc	300 Third Ave	N/A	No	No	No
DaVita Dialysis	470 Bridgeport Ave	N/A	No	No	No
Water and Wastewater					
Housatonic WWTF	1225 Oronoque Rd	Yes	No	Yes	Yes
Beaverbrook WWTF	75 Deerwood Ave	Yes	No	Yes	Yes
Wastewater Pumping Stations	45 locations throughout the City	Some	No	Some	Some

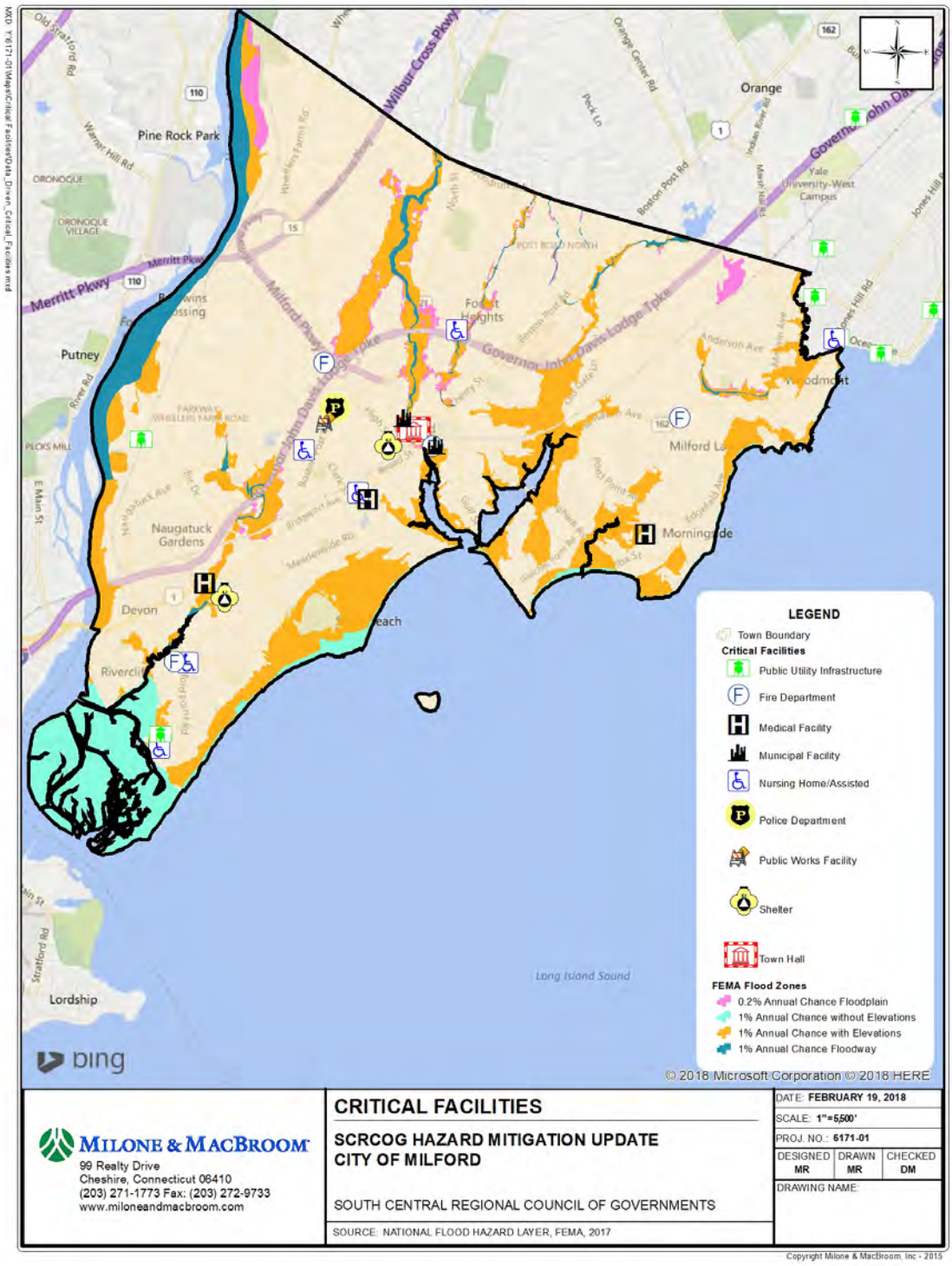


Figure 4-53 Critical Facilities and SFHA Map - Milford

VULNERABLE ASSETS—MILFORD

Vulnerable assets were identified by intersecting GIS-based asset inventories and demographic data with known hazard boundaries to determine the number of parcels, buildings, critical facilities, historic assets, and populations exposed to each hazard. This results in an estimation of vulnerable assets by hazard as shown in **Table 4-104.** **Figure 4-54** depicts the locations of historic resources.

Table 4-104 Vulnerable Assets by Hazard - Milford

Hazard	Number of Parcels[274]	Number of Buildings[275]	Critical Facilities[276]	Historic Assets[277]	Population[278]
Extreme Temperatures	19,387	22,397	22	350	8,306
Hurricane/Tropical Storm	19,387	22,397	22	350	51,271
Severe Thunderstorm	19,387	22,397	22	350	51,271
Severe Winter Storm/Nor'easter	19,387	22,397	22	350	51,271
Tornado	19,387	22,397	22	350	51,271
Coastal Erosion[279]	181	175	0	0	479
Dam Failure[280]					
High Hazard (Class C)	671	665	0	1	1,530
Significant Hazard (Class B)	N/A	N/A	N/A	N/A	N/A
Drought	19,387	22,397	22	350	51,271
Flood[281]					
1-Percent-Annual-Chance	4,012	2,814	2	27	6,472
0.2-Percent-Annual-Chance	468	235	0	9	541
Zone VE	797	477	0	0	1,097
Category 1 Storm Surge	2,977	1,129	0	0	2,597
Category 2 Storm Surge	3,659	2,085	1	0	4,796
Category 3 Storm Surge	3,119	2,132	0	3	4,904
Category 4 Storm Surge	2,791	1,873	0	1	4,308
Sea Level Rise	1,468	1,817	0	3	4,179
Earthquake	19,387	22,397	22	350	51,271
Wildfire	1,182	664	1	0	1,527

[274] Based on data provided by the City of Milford.
[275] Based on building numbers from CT ECO.
[276] Based on a combination of data provided by the City of Milford and Hazus-MH.
[277] Data for historic assets was not available at the time of this analysis.
[278] Based on population numbers from 2010 census data.
[279] Coastal Erosion Hazard determined using Analysis of Shoreline Change in Connecticut - published by DEEP, Sea Grant, and UConn/CLEAR
[280] Dam failure inundation mapping was available for Class C dams. Inundation mapping was not available for other dams located in the town.
[281] Results for the flood hazard are not cumulative. Numbers and values of assets for events of increasing magnitude should be read as "in addition to" the preceding magnitudes.

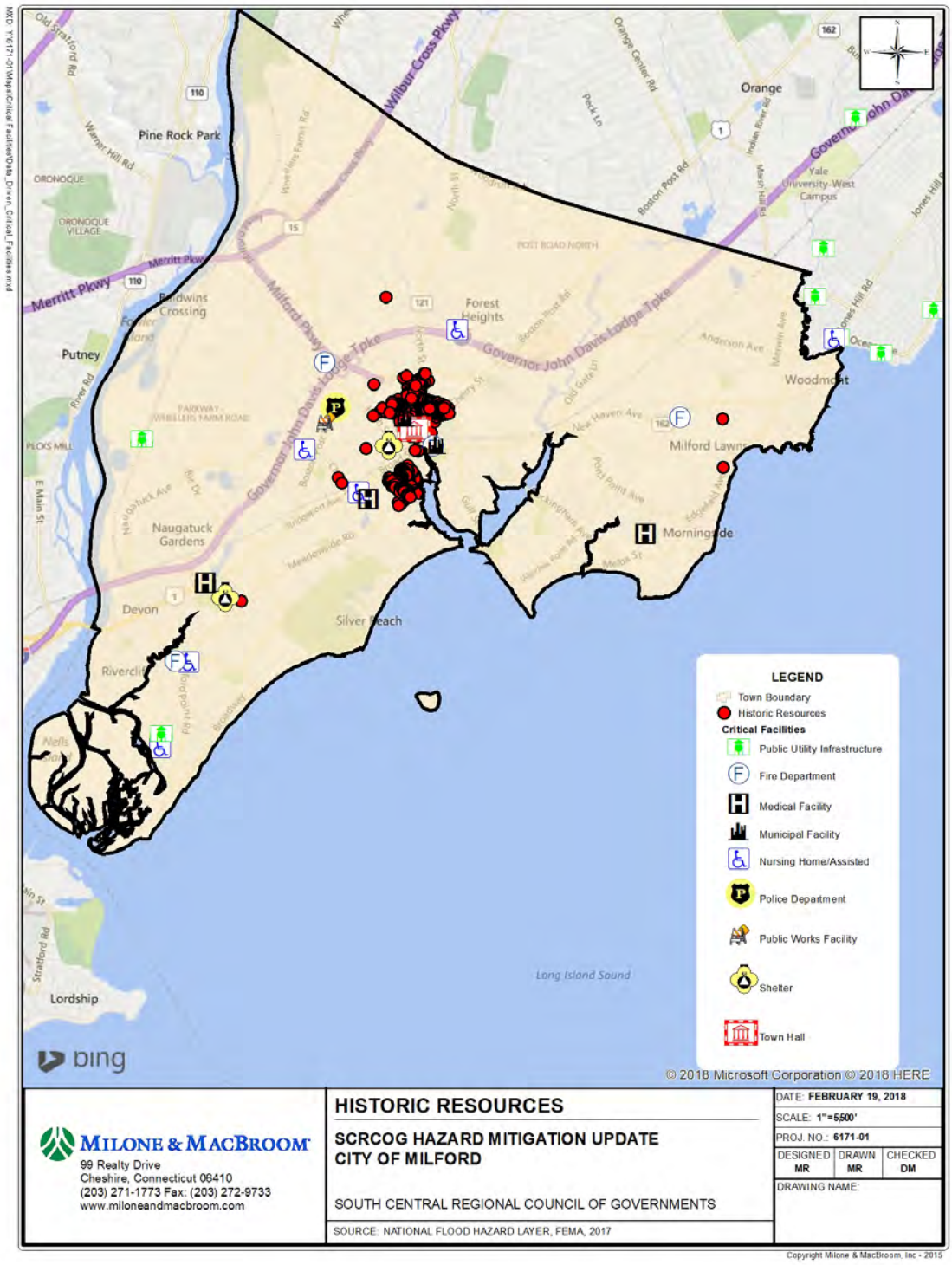


Figure 4-54 Historic Resources Map - Milford

REPETITIVE LOSS AND SEVERE REPETITIVE LOSS PROPERTIES

In addition to the spatial analysis conducted above, summary information for repetitive flood loss and severe repetitive flood loss properties within the City of Milford also provides an indication of vulnerable assets, especially with regard to properties insured under the National Flood Insurance Program that have experienced repeated flooding (see **Table 4-105**).[282]

Table 4-105 Repetitive Flood Loss and Severe Repetitive Flood Loss Summary - Milford

	Number of Losses	Number of Properties	Building Payments	Contents Payments	Total Payments
Repetitive Loss	1511	533	$45,848,365	$4,479,839	$50,328,204
Severe Repetitive Loss	142	27	$4,647,305	$652,813	$5,300,118

The majority of the RL properties are single-family homes. Ten are residential condominium units and 21 are multi-family homes. Only seven RL properties are non-residential, and these appear to be commercial and industrial uses.

As of July 31, 2017, the City of Milford had a total of 3,149 claims totaling $74,857,344 in losses for all NFIP-insured structures.

Figure 4-55 through **Figure 4-58** show dams, storm surge, sea level rise, and wildfire hazard areas within the City of Milford.

[282] Based on information provided by the Federal Emergency Management Agency current as of 12/31/2012.

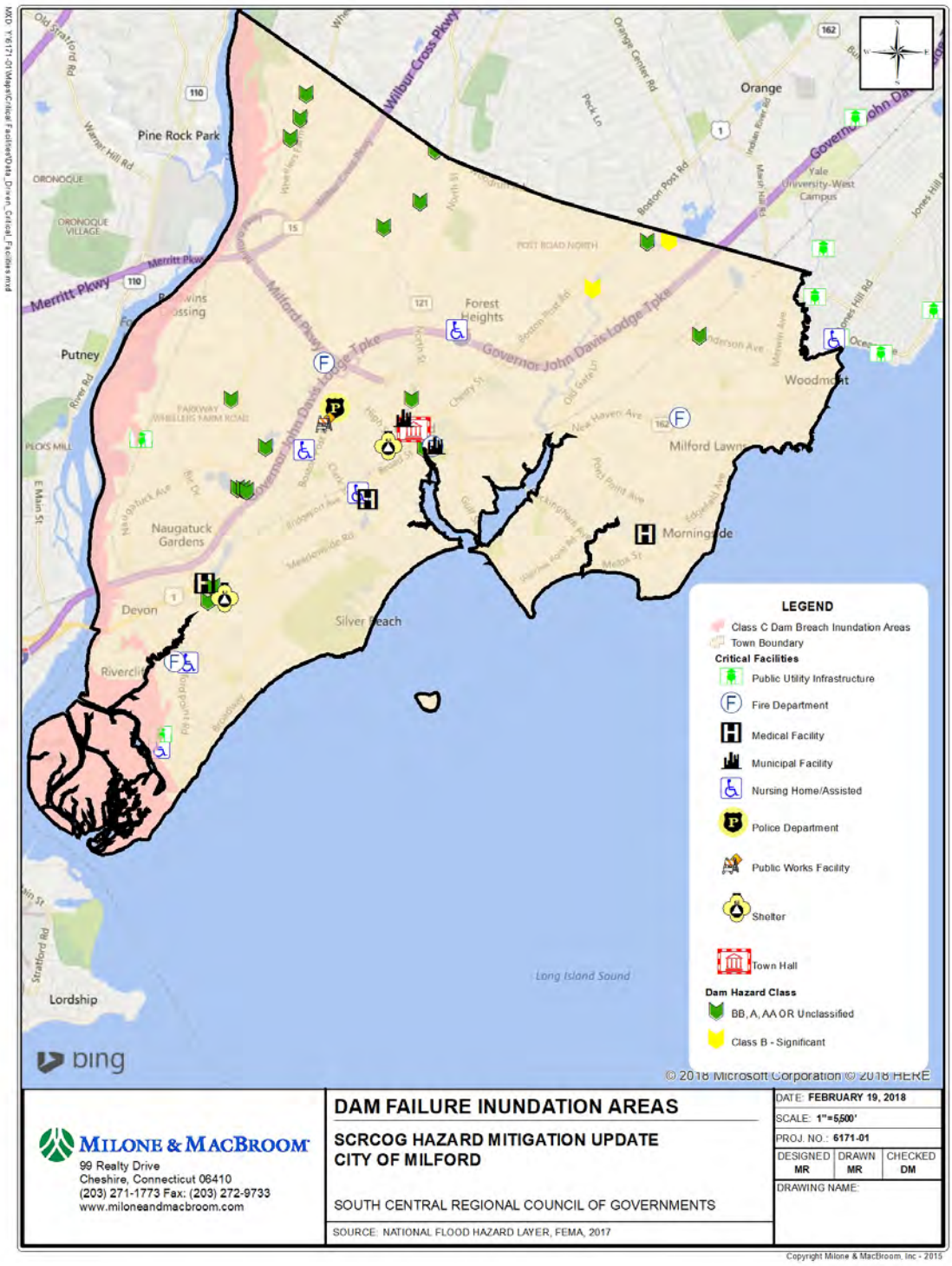


Figure 4-55 Dams Map - Milford

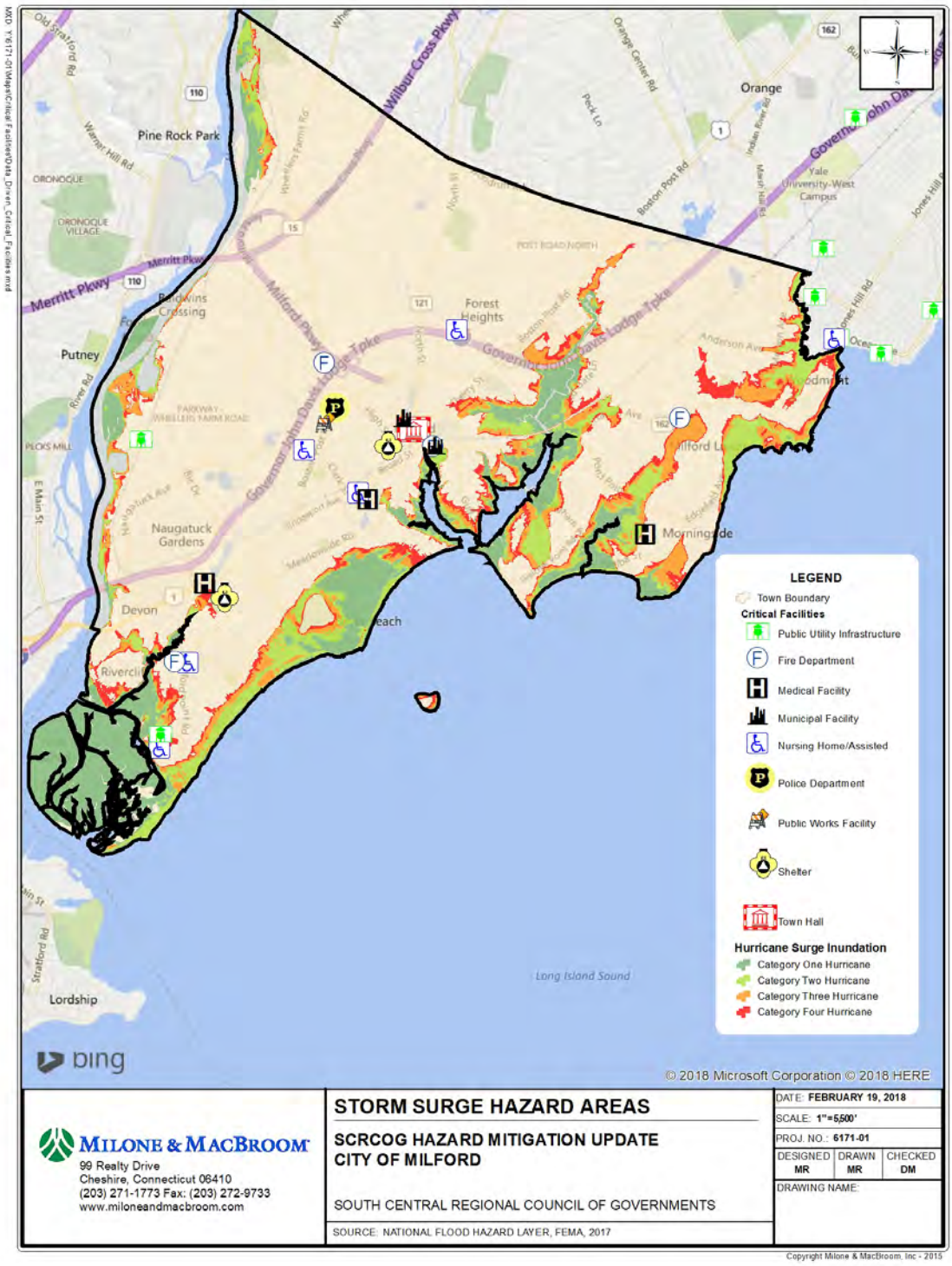


Figure 4-56 Hurricane Inundation Map - Milford

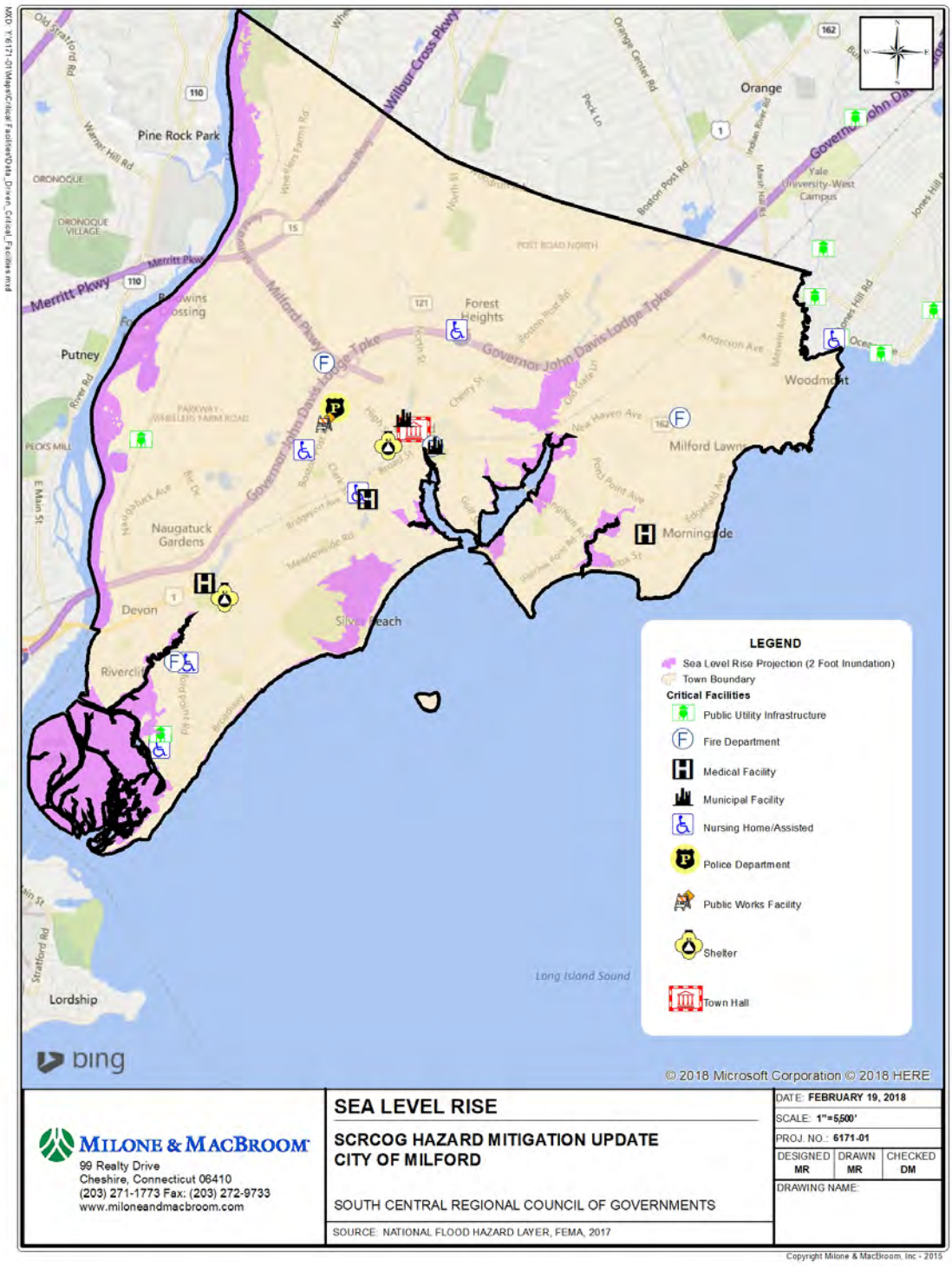


Figure 4-57 Sea Level Rise Map – Milford

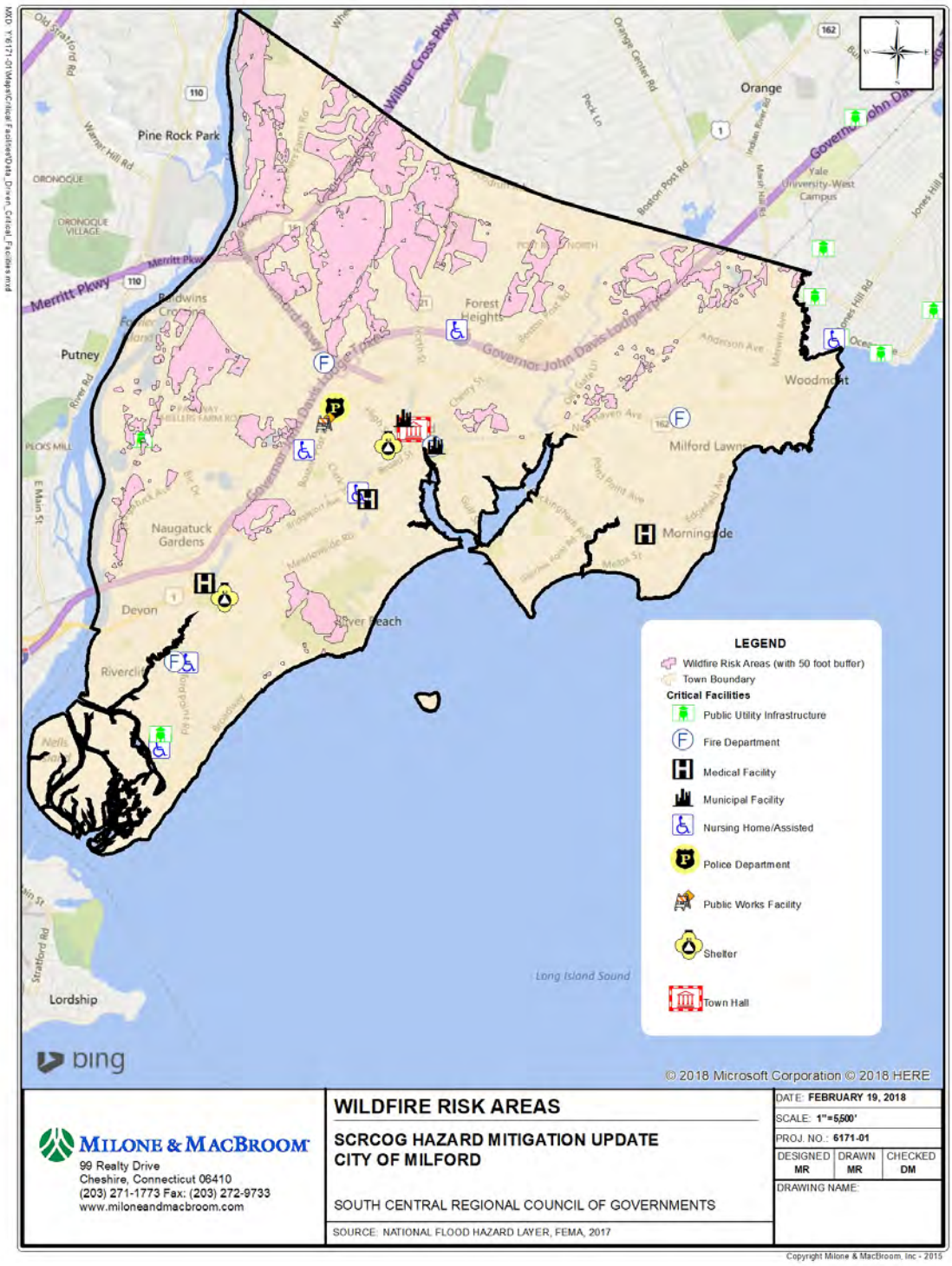


Figure 4-58 Wildfire Map - Milford

POTENTIAL IMPACTS—MILFORD

Table 4-106 shows the total estimated value of improved parcels (parcels that contain at least one building), critical facilities, and historic assets that intersect with known hazard areas, as an indicator of the potential impacts should a hazard event occur.

Table 4-106 Potential Impacts by Hazard - Milford[283]

Hazard	Value of At-Risk Parcels[284]	Value of At-Risk Critical Facilities	Value of At-Risk Historic Assets
Extreme Temperatures	$8,134,069,993	$94,475,550	$197,951,270
Hurricane/Tropical Storm	$8,134,069,993	$94,475,550	$197,951,270
Severe Thunderstorm	$8,134,069,993	$94,475,550	$197,951,270
Severe Winter Storm/Nor'easter	$8,134,069,993	$94,475,550	$197,951,270
Tornado	$8,134,069,993	$94,475,550	$197,951,270
Coastal Erosion[285]	$176,747,910	$0	$0
Dam Failure			
High Hazard (Class C)	$194,216,280	$308,160	$0
Significant Hazard[286] (Class B)	N/A	N/A	N/A
Drought	$8,134,069,993	$94,475,550	$197,951,270
Flood[287] [288]			
1-Percent-Annual-Chance	$809,974,160	$37,975,480	$37,753,370
0.2-Percent-Annual-Chance	$296,595,740	$39,688,420	$35,323,690
Zone VE	$563,133,490	$0	$0
Category 1 Storm Surge	$1,169,009,870	$0	$1,674,290
Category 2 Storm Surge	$984,677,050	$28,354,540	$2,642,920
Category 3 Storm Surge	$872,632,890	$28,354,540	$4,615,280
Category 4 Storm Surge	$892,512,816	$28,354,540	$14,167,660
Sea Level Rise	$681,623,340	$0	$1,267,460
Earthquake	$8,134,069,993	$94,475,550	$197,951,270
Wildfire	$1,034,424,447	$0	$0

[283] Potential Impacts are based on parcel exposure, not building exposure. It is possible for a historic asset or critical facility building to not be exposed, yet its associated parcel intersects a hazard area. The parcel value will then be reflected in the Potential Impacts Table.
[284] Based on estimated exposure values from Hazus-MH (building values only).
[285] Coastal Erosion Hazard determined using Analysis of Shoreline Change in Connecticut - published by DEEP, Sea Grant, and UConn/CLEAR
[286] Dam failure inundation mapping was available for Class C dams. Inundation mapping was not available for other dams located in the town.
[287] Results for the flood hazard are not cumulative. Numbers and values of assets for events of increasing magnitude should be read as "in addition to" the preceding magnitudes.
[288] Results for the hurricane inundation areas are cumulative. Numbers and values of assets for events of increasing magnitude should be read as "consisting of" the preceding magnitudes.

LOSS ESTIMATES—MILFORD

DETAILED HAZUS-MH LOSS ESTIMATES

Riverine Flood

Estimated building losses for the riverine flood hazard generated by Hazus-MH are broken down into two categories: direct building losses and business interruption losses. The direct building losses are the estimated costs to repair or replace the damage caused to the building and its contents. The business interruption losses are the losses associated with the inability to operate a business because of the damage sustained during the flood. Business interruption losses also include the temporary living expenses for those people displaced from their homes because of the flood (see Table 4-107**).**

Table 4-107 Riverine Flood Loss Estimates (1-Percent-Annual-Chance Flood) – Milford
Millions of Dollars

	Residential	Commercial	Industrial	Others	Total
Direct Building Loss					
Building	$12.76	$4.80	$0.79	$0.31	$18.65
Contents	$5.81	$14.83	$1.83	$1.84	$24.32
Inventory	$0.00	$0.18	$0.29	$0.04	$0.51
Subtotal	$18.57	$19.81	$2.90	$2.19	$43.48
Business Interruptions					
Income	$0.00	$0.09	$0.00	$0.00	$0.09
Relocation	$0.02	$0.00	$0.00	$0.00	$0.02
Rental Income	$0.00	$0.00	$0.00	$0.00	$0.00
Wage	$0.00	$0.07	$0.00	$0.01	$0.08
Subtotal	$0.02	$0.16	$0.00	$0.01	$0.19
TOTAL	**$18.59**	**$19.97**	**$2.90**	**$2.20**	**$43.67**

In addition, the Hazus-MH model estimates 281 households will be displaced due to the flood. Displacement includes households evacuated from within or very near to the inundated area. Of these, 524 people will seek temporary shelter in public shelters.

Hazus-MH was not used to calculate inland loss estimates for the 2013 Milford Hazard Mitigation Plan.

Coastal Flood

Estimated building losses for the coastal flood hazard generated by Hazus-MH are broken down into two categories: direct building losses and business interruption losses. The direct building losses are the estimated costs to repair or replace the damage caused to the building and its contents. The business interruption losses are the losses associated with the inability to operate a business because of the damage sustained during the flood.

Business interruption losses also include the temporary living expenses for those people displaced from their homes because of the flood (see Table 4-108).

Table 4-108 Coastal Flood Loss Estimates (100-year Event) – Milford
Millions of Dollars

	Residential	Commercial	Industrial	Others	Total
Direct Building Loss					
Building	$165.26	$19.07	$6.80	$1.89	$193.02
Contents	$145.80	$56.40	$13.97	$11.48	$227.66
Inventory	$0.00	$0.95	$1.89	$0.07	$2.91
Subtotal	**$311.07**	**$76.42**	**$22.66**	**$13.44**	**$423.59**
Business Interruptions					
Income	$0.00	$0.27	$0.00	$0.02	$0.29
Relocation	$0.39	$0.04	$0.00	$0.01	$0.43
Rental Income	$0.08	$0.02	$0.00	$0.00	$0.10
Wage	$0.01	$0.28	$0.00	$0.15	$0.43
Subtotal	**$0.47**	**$0.60**	**$0.00**	**$0.18**	**$1.25**
TOTAL	**$311.54**	**$77.03**	**$22.66**	**$13.61**	**$424.84**

In addition, the Hazus-MH model estimates 2,688 households will be displaced due to the flood. Displacement includes households evacuated from within or very near to the inundated area. Of these, 7,172 people will seek temporary shelter in public shelters.

Hazus-MH was not used to calculate coastal loss estimates for the 2013 Milford Hazard Mitigation Plan.

Hurricane Wind

Hazus-MH was used to model probabilistic hurricane wind impacts for the 10-, 20-, 50-, 100-, 200-, 500- and 1,000-year events. These annualized return periods compare to the Saffir-Simpson Scale in the following way:

- 10-year Tropical Depression/Tropical Storm
- 20-year Tropical Storm
- 50-year Tropical Storm/Category 1
- 100-year Category 1/Category 2
- 200-year Category 2
- 500-year Category 3
- 1000-year Category 3

The number of buildings estimated to be damaged and the resulting building-related economic losses are shown in Table 4-109 and Table 4-110.

Table 4-109 Number of Buildings Damaged - Milford

Return Period	Minor	Moderate	Severe	Destruction	Total
10-year	0	0	0	0	0
20-year	14	0	0	0	14
50-year	127	7	0	0	134
100-year	801	71	2	1	874
200-year	2,042	269	11	4	2,326
500-year	4,666	1,117	98	55	5,936
1,000-year	6,363	2,212	324	184	9,083

Table 4-110 Building-Related Economic Losses - Milford

Return Period	Minor	Moderate	Severe	Destruction	Total
10-year	$0	$0	$0	$0	$0
20-year	$413,550	$0	$0	$0	$413,550
50-year	$13,804,340	$359,560	$74,110	$40,270	$14,278,290
100-year	$41,337,840	$1,999,760	$535,740	$203,160	$44,076,510
200-year	$79,714,950	$6,865,680	$2,442,390	$917,040	$89,940,060
500-year	$212,751,230	$27,605,820	$12,086,330	$3,765,860	$256,209,240
1,000-year	$421,325,220	$63,835,190	$28,434,810	$8,202,240	$521,797,470

Additionally, shelter needs and debris generation are modeled by Hazus-MH. Results are in Table 4-111.

Table 4-111 Other Hurricane Impacts - Milford

Return Period	Debris Generated (Tons)	Households Displaced	Individuals Seeking Temporary Shelter
10-year	0	0	0
20-year	98	0	0
50-year	2,642	0	0
100-year	9,632	16	1
200-year	18,647	60	12
500-year	40,246	245	51
1,000-year	65,855	571	115

Other modeled impacts of this event include the following effects on essential facilities:

- After a 500-year hurricane, all 26 schools are expected to lose at least one day of use
- After a 1,000-year hurricane, 0 of 46 hospital beds at the one hospital will be available; after one week, all 46 beds will be operational. All 26 schools are expected to lose at least one day of use.

Hazus-MH was not used to calculate hurricane loss estimates for the 2013 Milford Hazard Mitigation Plan.

Earthquake

An earthquake scenario was developed using Hazus-MH that models a magnitude 6.4 earthquake with an epicenter 10 kilometers below East Haddam. The number of buildings estimated to be damaged and the resulting building-related economic losses are shown in Table 4-112 and Table 4-113.

Table 4-112 Number of Buildings Damaged - Milford

	Slight	Moderate	Extensive	Complete	Total
Count	2,360	739	118	14	3,231

Table 4-113 Building-Related Economic Losses – Milford

Millions of dollars

	Residential	Commercial	Industrial	Others	Total
Losses	$65.06	$70.31	$17.66	$6.15	$159.18

Other modeled impacts of this event include:

- Essential Facilities:
  - No essential facilities experience more than minor damage
  - No essential facilities experience a loss of functionality
- Transportation Infrastructure:
  - No highway segments or bridges experience more than minor damage; losses total $13.32 million
  - No highway segments or bridges experience a loss of functionality
  - No railway segments experience more than minor damage
  - No railway segments experience a loss of functionality
  - No bus facilities experience more than minor damage; losses total $270,000
  - No bus facilities experience a loss of functionality
  - No port facilities experience more than minor damage; losses total $120,000
  - No port facilities experience a loss of functionality
- Utilities:
  - Potable water pipelines: 94 leaks and 23 breaks. Total water system losses are $420,000
  - Wastewater pipelines: 67 leaks and 17 breaks, a loss of $1.78 million
  - Natural gas pipelines: 19 leaks and 5 breaks, a loss of $90,000
  - Electrical power facility losses total $2.31 million
  - No loss of water or electric service
- Shelter: 91 household will be displaced, with 43 individuals seeking temporary shelter in public shelters
- 2 to 7 individuals may require hospitalization and 0 to 1 individuals may be killed, depending on the time of day the earthquake strikes

Hazus-MH was not used to calculate earthquake loss estimates for the 2013 Milford Hazard Mitigation Plan.

ANNUALIZED LOSS ESTIMATES

Table 4-114 shows annualized loss estimates (ALE) for each hazard. Estimates were derived from a number of sources, as described in the Methodology section, and included in column two of the table:

- NFIP: Historic flood insurance claims processed for the community
- PA: Historic Public Assistance grants awarded to the community
- State HMP: Localized estimates based on those presented in the 2014 Connecticut Hazard Mitigation Plan
- HAZUS: Hazus-MH results from modeling performed for this multi-jurisdictional plan
- State HAZUS: Hazus-MH results from modeling performed for the 2014 Connecticut Hazard Mitigation Plan

Hazus-MH results for flooding and earthquake hazards (as run for this multi-jurisdictional plan) were not able to be annualized, and so are not included in the table below.

Table 4-114 Annualized Loss Estimates by Hazard - Milford

Hazard	Source	Annualized Loss Estimate
Flooding	NFIP	$1,912,659
	PA	$139,173
	State HMP	$12,445
Hurricane Wind Thunderstorm	HAZUS	$2,287,561
	PA	$69,586
	State HMP	$5,078
Tornado Winter Storm Dam Failure	State HMP	$529,892
	PA	$60,079
	State HMP	$393
	State HMP	$2,159
Wildfire	State HMP	$13,094
Earthquake	State HAZUS	$102,161

PROBLEM STATEMENTS—MILFORD

Table 4-115 provides statements of particular interest with regard to primary hazards of concern, geographic areas of concern, and vulnerable community assets within the City of Milford. If applicable, any noted potential solutions or mitigation actions are discussed with the problem statements.

Table 4-115 Problem Statements – Milford

Primary Hazards of Concern	
Trees	**Trees** – pockets of ash trees are dying. Falling trees/branches identified as significant hazard of concern, particularly as it relates to blocking roads and causing power outages.
Fire	Phragmites creates a **fire** hazard behind residences.
Flooding	**Flooding** is primary hazard, with most vulnerable structures being residential building types located in SFHAs including coastal high hazard areas (velocity zones). More than one-third of the city is located within a mapped SFHA. Hurricane storm surge and high velocity wave action is the chief concern, and has resulted in the extensive damage and destruction of many coastal properties in the recent past (Irene, Sandy). The built environment along the shoreline has changed due to recovery efforts from past storms.
Hurricanes, Tropical Storms, and Nor'easters	Coastal storms including **hurricanes, tropical storms, and nor'easters** are also of high concern, as these events have the potential to cause major and widespread damage to the entire community with both flooding and high wind hazards.
Sea Level Rise	**Sea level rise** is a growing concern due to the fact it will increase the frequency and severity of existing coastal erosion and flood hazards.
Snowstorms	Roof collapses were noted as a significant danger during **snowstorms**.
Geographic Areas of Concern	
Coastal Areas and Wepawaug River	Residential structures that are subject to flooding during significant flood events are primarily in the southern section of the City and are impacted by coastal flooding. There is a mix of the types of homes in the hazard areas, but those at risk are primarily

	single-family dwellings. Most homes are year-round not seasonal. Flooding along the Wepawaug River which bisects the city is also a concern.
The immediate shoreline.	Many of the homes areas located in the City's coastal high hazard area (velocity zone) are summer cottages that have been converted to year-round dwellings, which are smaller and built on smaller plots of land. This results in Milford's most highly dense residential neighborhoods being the most vulnerable. Over 100 homes have been elevated since Irene. Elevated homes create a new vulnerability for homes that are not elevated; those homes are now susceptible to flooding because the physical barrier of homes in front of them no longer exists. Elevated houses also present new, unknown challenges in terms of wind resistance. We do not know if the building code is as effective when a house is raised 10-15 feet off the ground. A study is being conducted by UConn to examine the effect of wind on elevated structures but we do not know the findings. Elevated houses have a different risk for fire. A house fire of an elevated home on Melba St presented a new challenge for city firefighters as the air moved differently underneath the open space under the home and the close proximity of elevated houses on either side of the burning structure also caught on fire.
Beaches	Beach areas subject to coastal flooding include the following: • Cedar Beach – Milford Point to the intersection of Milford Point Road and Seaview Avenue • Laurel Beach – Milford Point Road / Seaview Avenue to Wildermere Avenue • Wildermere Beach – Wildermere Avenue to Stowe Avenue • Walnut Beach – Stowe Avenue to Nettleton Avenue extended • Silver Beach – Silver Sands Parkway to Surf Avenue • Fort Trumbull Beach – Surf Avenue to Rogers Avenue • Gulf Beach – Milford Harbor to Point Lookout • Bayview Beach – Point Lookout to Calf Pen Meadow Creek • Pond Point Beach – Calf Pen Meadow Creek to Buckingham Avenue • Point Beach – Buckingham Avenue to Hilldale Court • Morningside Beach – Hilldale Court to South Street • Hillside Area – South Street to Seabreeze / Merwin Avenue, Benjamin Street • Anchor Beach – Benjamin Street to Beach Avenue • Woodmont – Beach Avenue to West Haven Line
Tidal Areas	Areas that experience recurring tidal flooding include Laurel Beach by Milford Point Road, along Field Court, areas along Calf Pen Meadow Creek – particularly Melba St and Beachland Avenue, and the finger streets off East Broadway. The Silver Sands Area at East Broadway into Great Creak Area floods on the back sides of homes. The Coastal Resilience Plan addresses the dead-end finger streets. Most often the homes toward the end of the street have implemented mitigation measures and the homes in the middle have not.
Commercial Areas	Areas of commercial properties at risk to flooding: • Downtown/Milford Harbor Area • Wepawaug River (North of I – 95 south to Route 1) • North side of Bridgeport Ave (between School House Road & Silver Sands Parkway) • New Haven Avenue businesses adjacent to Gulf Pond outlet/Old Gate Lane • 750 & 772 Bridgeport Avenue • Intersection of Boston Post Road and Woodruff Road
Platt Street/Point Beach	Platt Street/Point Beach – experiences flooding
Trumbull Avenue	Trumbull Avenue Revetment

Indian River	Indian River/between Downtown and Old Gate Lane
Vulnerable Community Assets	
Assets Vulnerable to Hurricane Surge	Nearly $1 billion in city infrastructure is at risk to hurricane storm surge (up to Category 4) including an animal shelter, two wastewater treatment plants, an elementary school, and a middle school.
Beaverbrook Wastewater Treatment Facility	The City's Beaverbrook Wastewater Treatment facility is at risk to flooding. Beaverbrook serves as a secondary treatment facility that augments the main Housatonic Wastewater Treatment facility, serving approximately 15,000 of Milford's 52,000 residents. The City is considering a FEMA grant to construct a berm around the plant with a 25% match from the City. There are grant approval requirements and funding obligations that the City is exploring to see if this is a viable project to be implemented.
Roofs	All 14 of Milford's schools, both wastewater treatment plants, the City Library, Police Station, City Hall, Parson's Government Center, and the Public Works Complex all have flat roofs and are considered susceptible to collapse under heavy snow loads. Many businesses in the city also have flat roofs. All the schools are getting new roofs and some are getting new windows. The Parsons Government complex also had its roof replaced in 2017.
Communication & Data	The city offices are also now on a fiber optic network and the financial management system is cloud based for resiliency.
Schick Razor Company	Schick Razor Company experiences repeated flooding.
Connecticut Post Mall	Connecticut Post Mall experiences flooding.
Jonathan Law High School	The Jonathan Law High School is the primary shelter and it has a generator powered by natural gas.
Animal Shelter	Animal Shelter – vulnerable to flooding and may become an island, pets are evacuated prior to flooding to Orange.
Tri Beach and the Margret Egan Recreation Centers	Tri Beach and the Margret Egan Recreation Centers are vulnerable to flooding
Sewer pump stations	A number of sewer pump stations are at risk for storm water inundation, putting their electrical systems in danger. Where possible these pump stations should be elevated and protected. Separately, some pump station generators are more than 50-60 years old and parts are no longer available to service them. These generators need to be replaced and elevated.

CHANGES/IMPROVEMENTS SINCE 2014

- Milford was not a part of the original Multi-Jurisdiction Hazard Mitigation Plan. These problem statements were developed from their 2013 Hazard Mitigation Plan and updated to reflect current conditions

NEW HAVEN

CRITICAL FACILITIES – NEW HAVEN

Table 4-116 contains a list of critical facilities provided by the City of New Haven. These are depicted on **Figure 4-59** along with FEMA flood zones.

Table 4-116 Critical Facilities – New Haven

Facility	Location	Emergency Power Supply?	Shelter?	In Floodplain or Coastal Flood Hazard Area?	In Surge Zones?
Emergency Services					
Emergency Operations Center	200 Orange Street	N/A	No	No	N/A
City Hall/Government Center	165 Church Street, 200 Orange Street	N/A	No	No	N/A
New Haven Health Department	54 Meadow Street	N/A	No	No	N/A
New Haven School Department	54 Meadow Street	N/A	No	No	N/A
New Haven Fire Training Academy	230 Ella T. Grasso Boulevard	N/A	Yes	Yes	N/A
Hill South Police	410 Howard Avenue	N/A	No	No	N/A
Department of Police Services	1 Union Avenue	N/A	No	Yes	N/A
Dwight-Chapel/West River	150 Edgewood Avenue	N/A	No	No	N/A
Hill North	90 Hallock Street	N/A	No	No	N/A
Dixwell	28 Charles Street	N/A	No	No	N/A
Newhallville/East Rock	596 Winchester Avenue	N/A	No	No	N/A
Fair Haven	295 Blatchley Avenue	N/A	No	No	N/A
East Shore/Fair Haven Heights/Quinnipiac East	830 Woodward Avenue	N/A	No	No	N/A
Beaver Hills/Whalley Avenue	386 Whalley Avenue	N/A	No	No	N/A
Fire Department Headquarters	952 Grand Avenue	N/A	No	No	N/A
Dixwell Fire Station	125 Goffe Street	N/A	No	No	N/A
East Grand Fire Station	73 East Grand Avenue	N/A	No	No	N/A
Fountain Street Fire Station	105 Fountain Street	N/A	No	No	N/A
Hill Fire Station	525 Howard Avenue	N/A	No	No	N/A
Lighthouse Fire Station	510 Lighthouse Road	N/A	No	Yes	N/A
Whitney Avenue Fire Station	350 Whitney Avenue	N/A	No	No	N/A
Woodward Avenue Fire Station	826 Woodward Avenue	N/A	No	No	N/A
Westside Battalion Chief Fire Station	120 Ellsworth Avenue	N/A	No	No	N/A
Eastside Battalion Chief Fire Station	412 Lombard Street	N/A	No	No	N/A
Health Care and Senior Living Facilities					
Yale-New Haven Hospital	Yale-New Haven Hospital	Yale-New Haven Hospital	Yale-New Haven Hospital	Yale-New Haven Hospital	Yale-New Haven Hospital
St. Raphael Hospital	St. Raphael Hospital	St. Raphael Hospital	St. Raphael Hospital	St. Raphael Hospital	St. Raphael Hospital
Municipal Facilities					
Department of Public Works	34 Middletown Avenue	N/A	No	No	N/A
Department of Parks and	720 Edgewood	N/A	No	Yes	N/A

Facility	Location	Emergency Power Supply?	Shelter?	In Floodplain or Coastal Flood Hazard Area?	In Surge Zones?
Recreation	Avenue				
Kathryn Brennan High School Gymnasium	200 Wilmot Road	N/A	No	No	N/A
Hill Career High School	140 Legion Avenue	N/A	Yes	No	N/A
James Hillhouse High School	480 Sherman Parkway	N/A	Yes	No	N/A
Wilbur Cross High School	181 Mitchell Drive	N/A	Yes	Yes	N/A
Nathan Hale School	480 Townsend Avenue	N/A	Yes	No	N/A
Tweed New Haven Airport	155 Burr Street	N/A	No	Yes	N/A
Southern CT State University	501 Crescent Street	N/A	No	No	N/A
East Shore Park	250 Woodward Avenue	N/A	No	Yes	N/A
Sports Haven	600 Long Wharf Drive	N/A	No	Yes	N/A
Yale University Athletic Fields	76 Yale Avenue	N/A	No	Yes	N/A
New Haven Main Library	133 Elm Street	N/A	No	No	N/A
Water and Wastewater					
GNHWPCA • Plant • 45 Pump Stations • Admin Facilities • Siphon • Tank		N/A	No	N/A	N/A
Regional Water Authority	90 Sargent Drive	N/A	No	Yes	N/A
Regional Transportation					
Union Station (rail, bus)	170 Union Avenue	N/A	No	Yes	N/A
Other Infrastructure and Facilities					
Tier 1 and Tier 2 facilities for United Illuminating		N/A	No		N/A
United Illuminating Grand Avenue sub-station	Grand Avenue	N/A	No	Yes	Yes

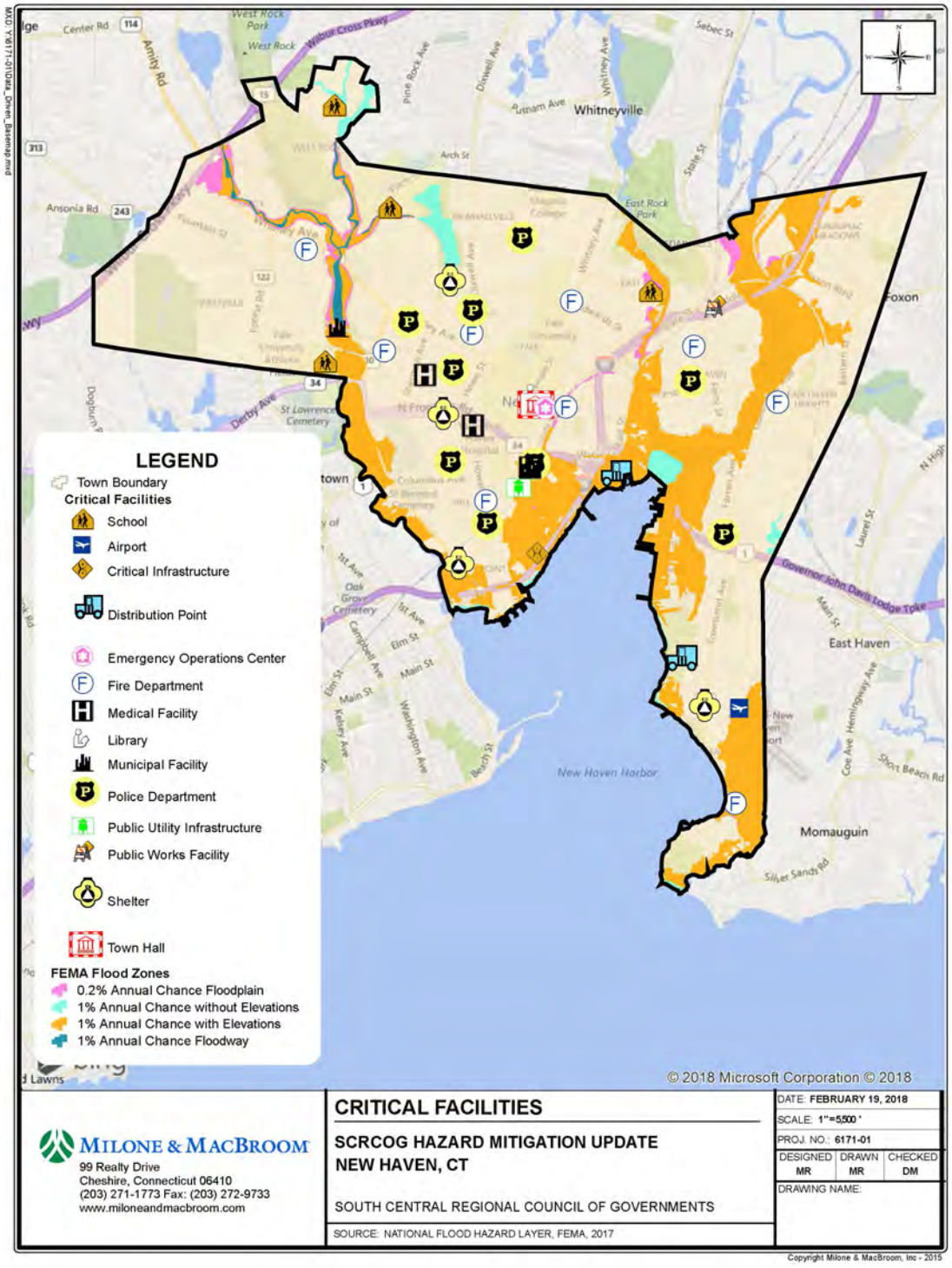


Figure 4-59 Critical Facilities and SFHA Map – New Haven

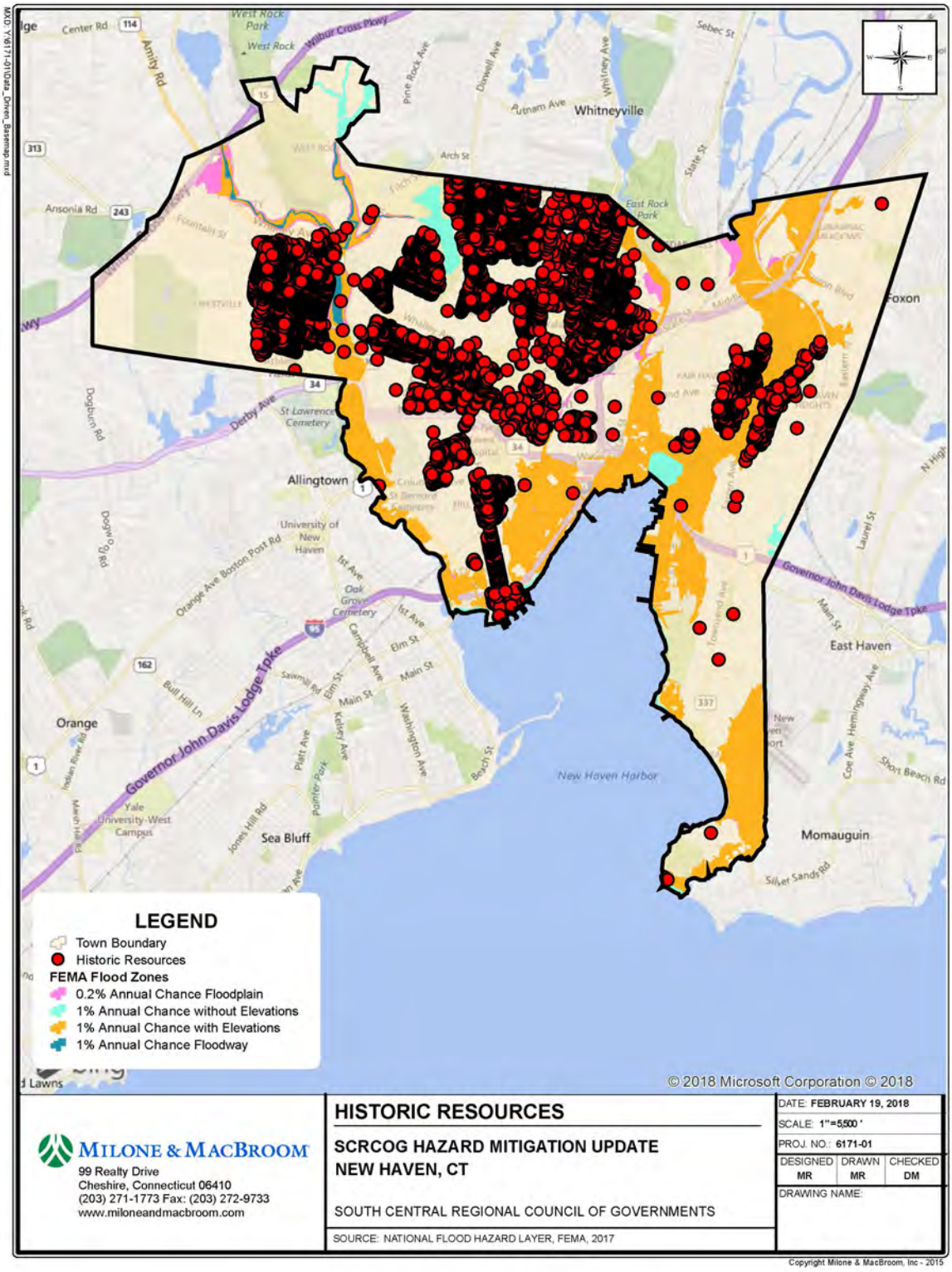
VULNERABLE ASSETS—NEW HAVEN

Vulnerable assets were identified by intersecting GIS-based asset inventories and demographic data with known hazard boundaries to determine the number of parcels, buildings, critical facilities, historic assets, and populations exposed to each hazard. This results in an estimation of vulnerable assets by hazard as shown in **Table 4-116**. **Figure 4-60** depicts the locations of historic resources.

Table 4-117 Vulnerable Assets by Hazard - New Haven

Hazard	Number of Parcels[289]	Number of Buildings[290]	Critical Facilities[291]	Historic Assets[292]	Population[293]
Extreme Temperatures	23,711	27,514	41	8,982	11,950
Hurricane/Tropical Storm	23,711	27,514	41	8,982	129,890
Severe Thunderstorm	23,711	27,514	41	8,982	129,890
Severe Winter Storm/Nor'easter	23,711	27,514	41	8,982	129,890
Tornado	23,711	27,514	41	8,982	129,890
Coastal Erosion[294]	67	66	0	9	157
Dam Failure[295]					
High Hazard (Class C)	710	646	3	47	1,537
Significant Hazard[296] (Class B)	N/A	N/A	N/A	N/A	N/A
Drought	23,711	27,514	41	8,982	129,890
Flood[297]					
1-Percent-Annual-Chance	1,826	1,550	5	162	3,689
0.2-Percent-Annual-Chance	333	226	2	13	538
Zone VE	142	66	0	2	157
Category 1 Storm Surge	1,460	801	1	50	1906
Category 2 Storm Surge	1,949	1,319	6	130	3,139
Category 3 Storm Surge	2,114	1,450	1	135	3,451
Category 4 Storm Surge	2,097	1,305	2	89	3,106
Sea Level Rise	601	2,014	0	9	4,793
Earthquake	23,711	27,514	41	8,982	129,890
Wildfire	539	213	0	17	507

[289] Based on data provided by the City of New Haven.
[290] Based on building numbers from CT ECO.
[291] Based on a combination of data provided by the City of New Haven and Hazus-MH.
[292] Data for historic assets was not available at the time of this analysis.
[293] Based on population numbers from 2010 census data.
[294] Coastal Erosion Hazard determined using Analysis of Shoreline Change in Connecticut - published by DEEP, Sea Grant, and UConn/CLEAR
[295] Dam failure inundation mapping was available for Class C dams. Inundation mapping was not available for other dams located in the City of New Haven.
[296] Dam failure inundation mapping was available for Class C dams. Inundation mapping was not available for other dams located in the town.
[297] Results for the flood hazard are not cumulative. Numbers and values of assets for events of increasing magnitude should be read as "in addition to" the preceding magnitudes.


LEGEND
Town Boundary
Historic Resources
FEMA Flood Zones
0.2% Annual Chance Floodplain
1% Annual Chance without Elevations
1% Annual Chance with Elevations
1% Annual Chance Floodway
Whitneyville
Foxon
Allingtown
East Haven
Orange
Sea Bluff
Momauguin
New Haven Harbor
Governor John Davis Lodge Tpke
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Cheshire, Connecticut 06410
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www.miloneandmacbroom.com
HISTORIC RESOURCES
SCRCOG HAZARD MITIGATION UPDATE
NEW HAVEN, CT
SOUTH CENTRAL REGIONAL COUNCIL OF GOVERNMENTS
SOURCE: NATIONAL FLOOD HAZARD LAYER, FEMA, 2017
DATE: FEBRUARY 19, 2018
SCALE: 1"=5,500 '
PROJ. NO.: 6171-01
DESIGNED MR
DRAWN MR
CHECKED DM
DRAWING NAME:
Copyright Milone & MacBroom, Inc - 2015

Figure 4-60 Historic Resources Map – New Haven

REPETITIVE LOSS AND SEVERE REPETITIVE LOSS PROPERTIES

In addition to the spatial analysis conducted above, summary information for repetitive flood loss and severe repetitive flood loss properties within the City of New Haven also provides an indication of vulnerable assets, especially with regard to properties insured under the National Flood Insurance Program that have experienced repeated flooding (see **Table 4-118**).[298]

Table 4-118 Repetitive Flood Loss and Severe Repetitive Flood Loss Summary - New Haven

	Number of Losses	Number of Properties	Building Payments	Contents Payments	Total Payments
Repetitive Loss	95	42	$1,121,224	$543,676	$1,664,901
Severe Repetitive Loss	5	1	$43,199	$2,083	$45,282

The majority of the RL properties are evenly divided among single-family homes, residential condominium units, and multi-family homes. Only seven RL properties are non-residential, and these appear to be commercial and industrial uses.

As of August 31, 2017, the City of New Haven had a total of 422 claims totaling $5,043,909 in losses for all NFIP-insured structures.

Figure 4-61 through **Figure 4-64** show dams, storm surge, sea level rise, and wildfire hazard areas within the City of Milford.

[298] Based on information provided by the Federal Emergency Management Agency current as of 12/31/2012.

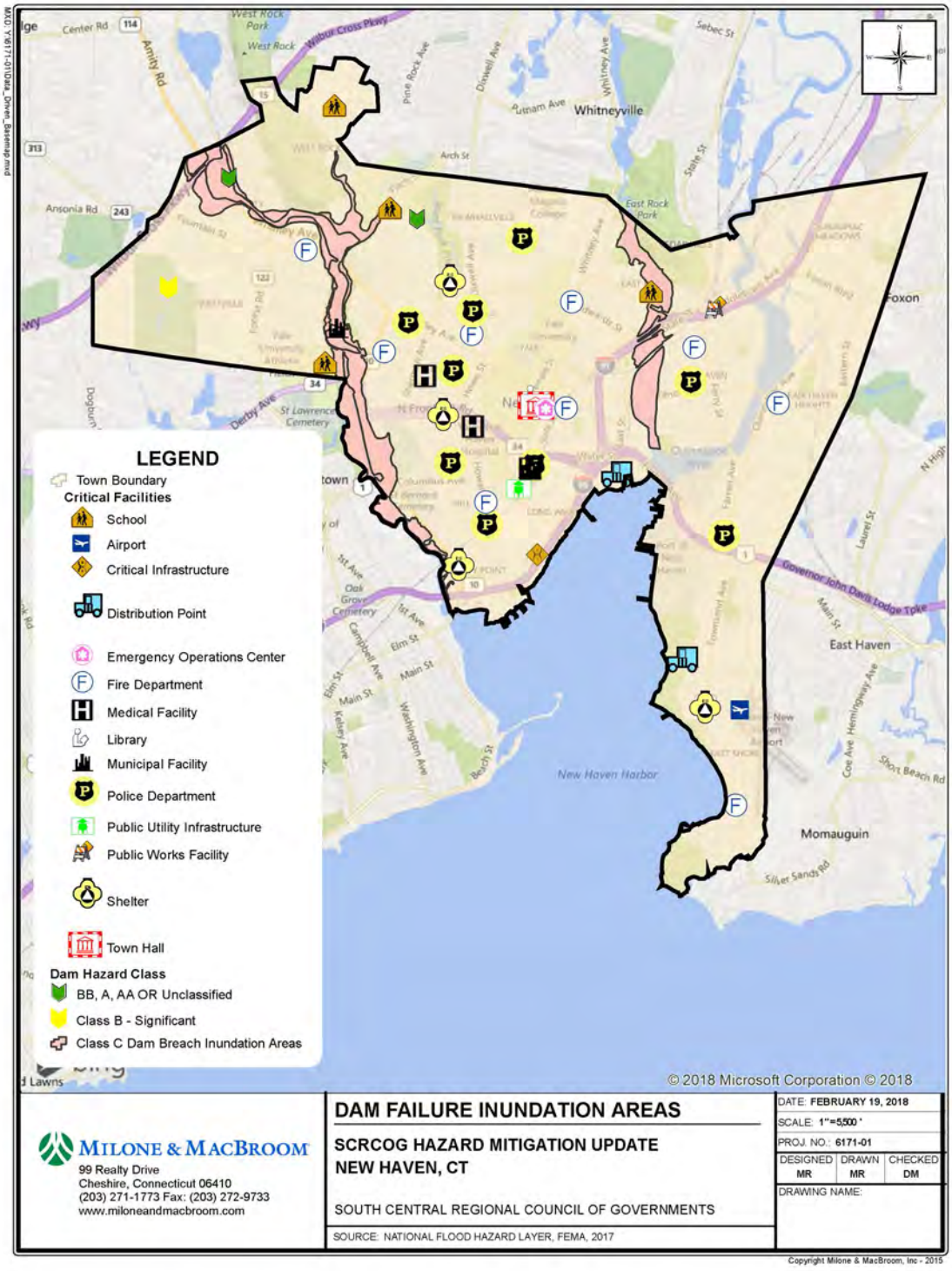


Figure 4-61 Dams Map – New Haven

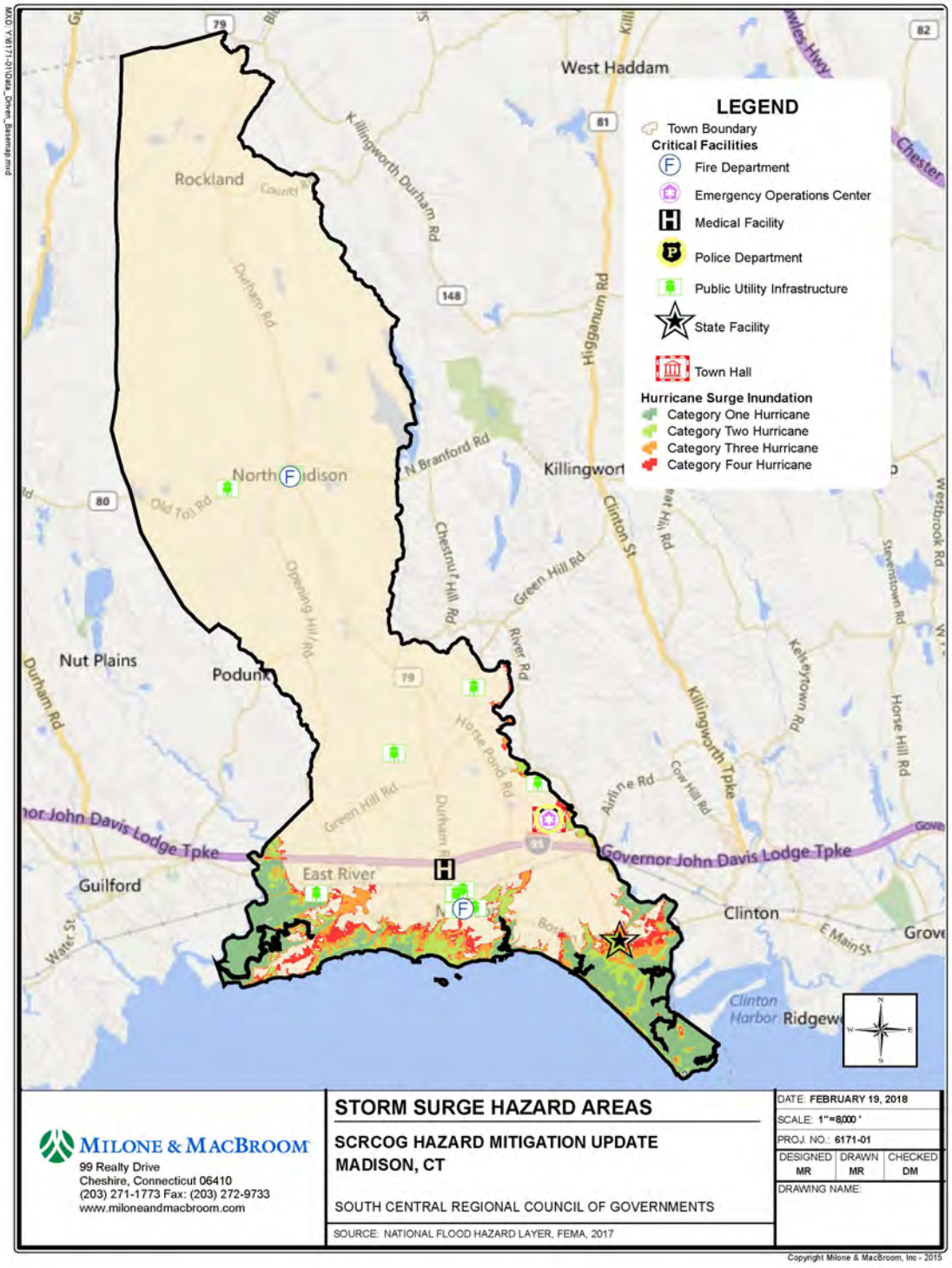


Figure 4-62 Hurricane Inundation Map – New Haven

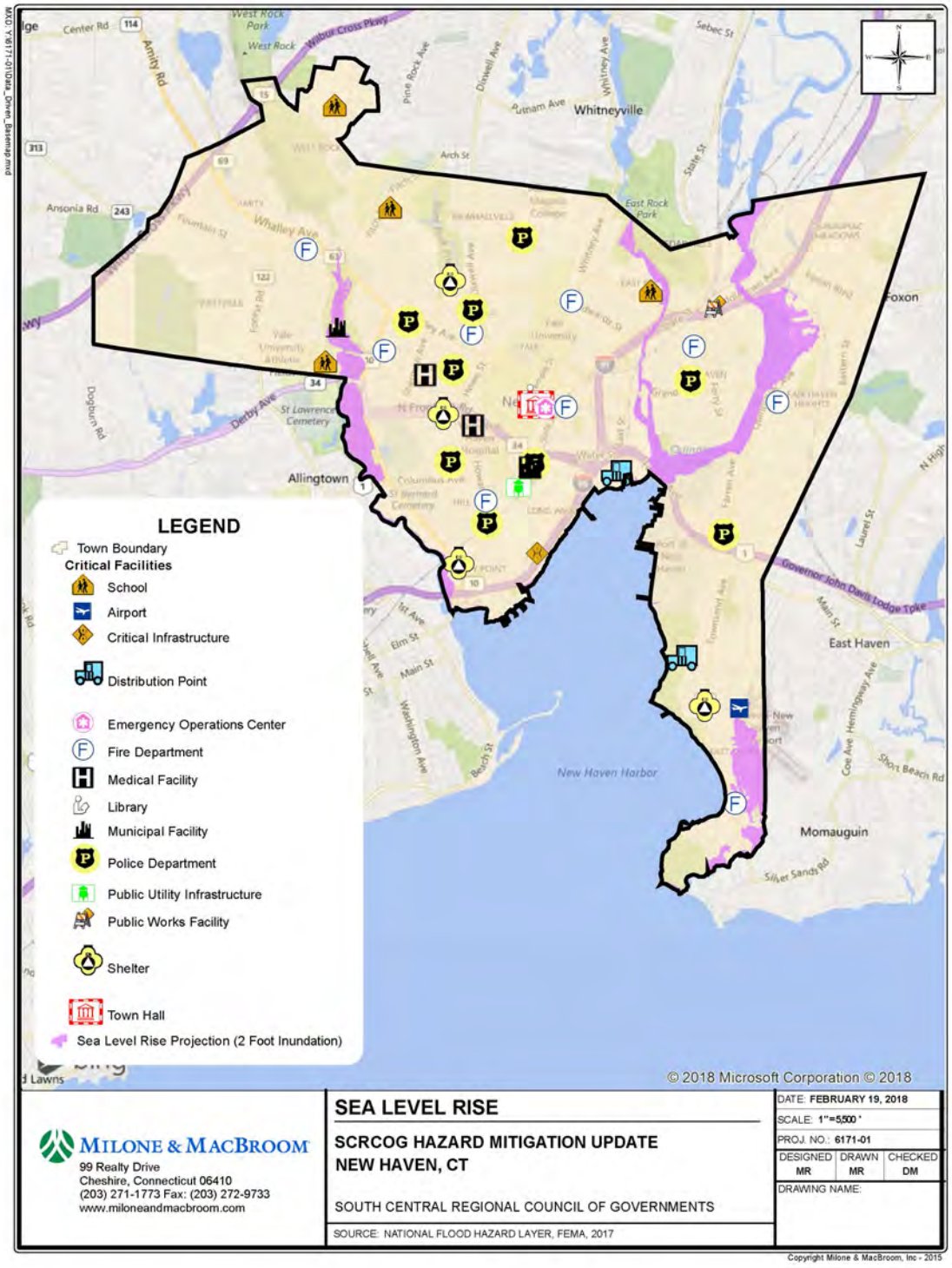


Figure 4-63 Sea Level Rise – New Haven

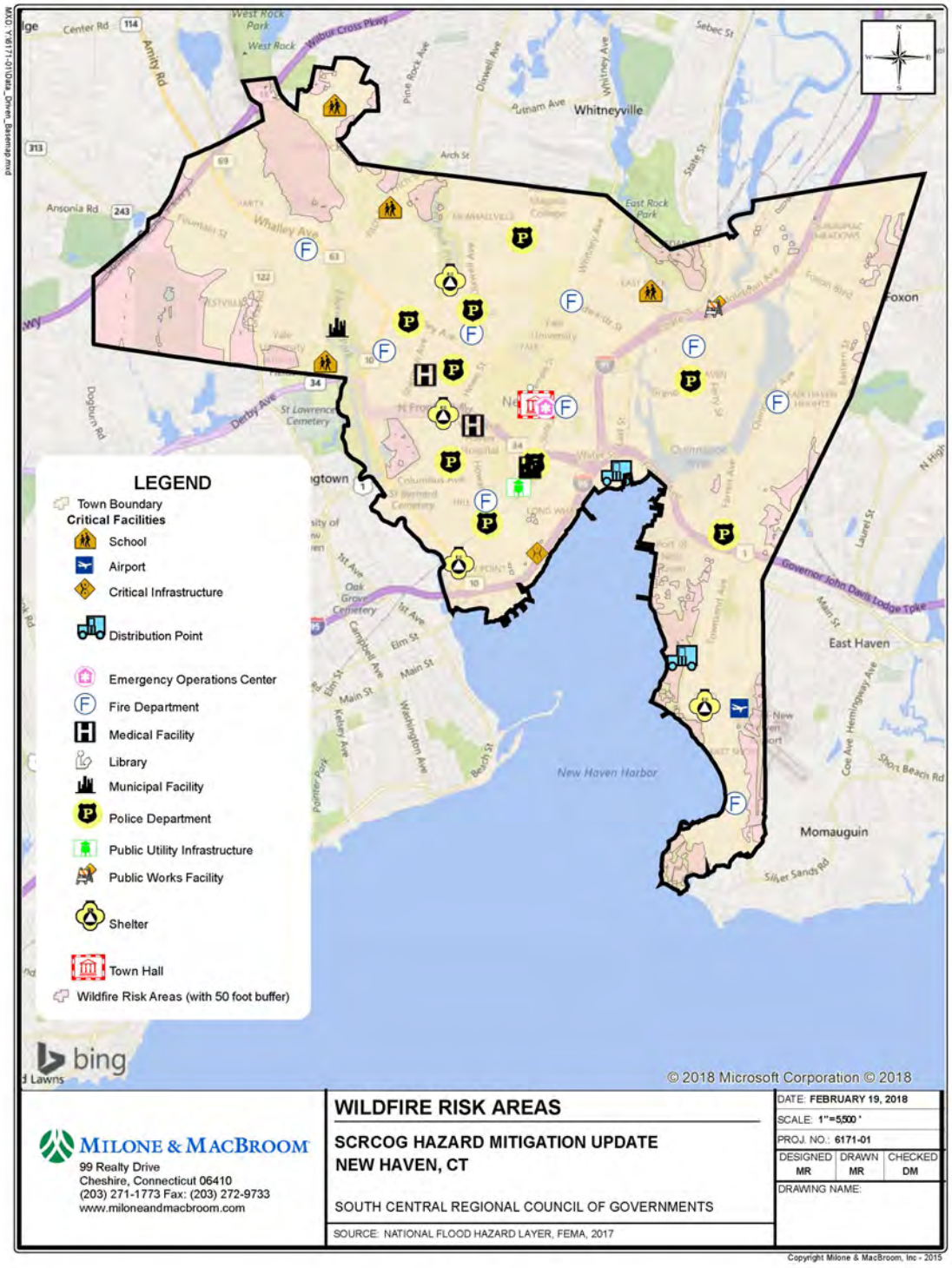


Figure 4-64 Wildfire Map – New Haven

POTENTIAL IMPACTS—NEW HAVEN

Table 4-119 shows the total estimated value of improved parcels (parcels that contain at least one building), critical facilities, and historic assets that intersect with known hazard areas, as an indicator of the potential impacts should a hazard event occur.

Table 4-119 Potential Impacts by Hazard – New Haven[299]

Hazard	Value of At-Risk Parcels[300]	Value of At-Risk Critical Facilities[301]	Value of At-Risk Historic Assets
Extreme Temperatures	$15,132,811,337	$994,264,678	$3,538,010,514
Hurricane/Tropical Storm	$15,132,811,337	$994,264,678	$3,538,010,514
Severe Thunderstorm	$15,132,811,337	$994,264,678	$3,538,010,514
Severe Winter Storm/Nor'easter	$15,132,811,337	$994,264,678	$3,538,010,514
Tornado	$15,132,811,337	$994,264,678	$3,538,010,514
Coastal Erosion[302]	$201,166,559	$11,295,480	$49,145,630
Dam Failure			
High Hazard (Class C)	$558,202,262	$42,761,200	$97,999,466
Significant Hazard[303] (Class B)	N/A	N/A	N/A
Drought	$15,132,811,337	$994,264,678	$3,538,010,514
Flood[304] [305]			
1-Percent-Annual-Chance	$2,272,748,784	$163,488,300	$155,114,998
0.2-Percent-Annual-Chance	$327,285,864	$5,320,000	$97,569,564
Zone VE	$335,868,289	$16,136,400	$49,390,330
Category 1 Storm Surge	$655,441,690	$95,075,600	$77,451,298
Category 2 Storm Surge	$2,111,261,297	$155,174,700	$236,673,098
Category 3 Storm Surge	$2,158,505,665	$155,174,700	$251,221,364
Category 4 Storm Surge	$1,944,656,348	$124,664,800	$250,687,788
Sea Level Rise	$626,501,325	$97,098,700	$117,098,430
Earthquake	$15,132,811,337	$994,264,678	$3,538,010,514
Wildfire	$1,578,849,947	$320,663,600	$38,159,400

[299] Potential Impacts are based on parcel exposure, not building exposure. It is possible for a historic asset or critical facility building to not be exposed, yet its associated parcel intersects a hazard area. The parcel value will then be reflected in the Potential Impacts Table.
[300] Based on estimated exposure values from Hazus-MH (building values only).
[301] Based on estimated building values from Hazus-MH.
[302] Coastal Erosion Hazard determined using Analysis of Shoreline Change in Connecticut - published by DEEP, Sea Grant, and UConn/CLEAR
[303] Dam failure inundation mapping was available for Class C dams. Inundation mapping was not available for other dams located in the town.
[304] Results for the flood hazard are not cumulative. Numbers and values of assets for events of increasing magnitude should be read as "in addition to" the preceding magnitudes.
[305] Results for the hurricane inundation areas are cumulative. Numbers and values of assets for events of increasing magnitude should be read as "consisting of" the preceding magnitudes.

LOSS ESTIMATES—NEW HAVEN

DETAILED HAZUS-MH LOSS ESTIMATES

Riverine Flood

Estimated building losses for the riverine flood hazard generated by Hazus-MH are broken down into two categories: direct building losses and business interruption losses. The direct building losses are the estimated costs to repair or replace the damage caused to the building and its contents. The business interruption losses are the losses associated with the inability to operate a business because of the damage sustained during the flood. Business interruption losses also include the temporary living expenses for those people displaced from their homes because of the flood (see **Table 4-120)**.

Table 4-120 Riverine Flood Loss Estimates (1-Percent-Annual-Chance Flood) - New Haven
Millions of Dollars

	Residential	Commercial	Industrial	Others	Total
Direct Building Loss					
Building	$11.30	$6.36	$0.40	$0.77	$18.82
Contents	$11.22	$19.74	$0.67	$4.32	$35.95
Inventory	$0.00	$0.14	$0.08	$0.11	$0.33
Subtotal	**$22.51**	**$26.23**	**$1.14**	**$5.21**	**$55.09**
Business Interruptions					
Income	$0.00	$0.14	$0.00	$0.01	$0.15
Relocation	$0.01	$0.02	$0.00	$0.00	$0.03
Rental Income	$0.03	$0.01	$0.00	$0.00	$0.04
Wage	$0.01	$0.12	$0.00	$0.02	$0.15
Subtotal	**$0.05**	**$0.28**	**$0.00**	**$0.03**	**$0.37**
TOTAL	**$22.56**	**$26.52**	**$1.14**	**$5.24**	**$55.46**

In addition, the Hazus-MH model estimates 400 households will be displaced due to the flood. Displacement includes households evacuated from within or very near to the inundated area. Of these, 1,110 people will seek temporary shelter in public shelters.

One of 66 schools is expected to experience at least moderate damage and loss of at least one day of use.

Coastal Flood

Estimated building losses for the coastal flood hazard generated by Hazus-MH are broken down into two categories: direct building losses and business interruption losses. The direct building losses are the estimated costs to repair or replace the damage caused to the building and its contents. The business interruption losses are the losses associated with the inability to operate a business because of the damage sustained during the flood.

Business interruption losses also include the temporary living expenses for those people displaced from their homes because of the flood (see Table 4-121).

Table 4-121 Coastal Flood Loss Estimates (100-year Event) – New Haven
Millions of Dollars

	Residential	Commercial	Industrial	Others	Total
Direct Building Loss					
Building	$32.01	$29.74	$17.02	$2.31	$81.08
Contents	$24.52	$78.42	$42.71	$14.57	$160.22
Inventory	$0.00	$1.73	$5.60	$0.03	$7.36
Subtotal	**$56.54**	**$109.88**	**$65.34**	**$16.91**	**$248.67**
Business Interruptions					
Income	$0.00	$0.59	$0.00	$0.03	$0.63
Relocation	$0.05	$0.12	$0.01	$0.01	$0.19
Rental Income	$0.03	$0.08	$0.00	$0.00	$0.11
Wage	$0.02	$0.58	$0.01	$0.30	$0.90
Subtotal	**$0.09**	**$1.38**	**$0.01**	**$0.35**	**$1.83**
TOTAL	**$56.63**	**$111.26**	**$65.35**	**$17.25**	**$250.50**

In addition, the Hazus-MH model estimates 1,122 households will be displaced due to the flood. Displacement includes households evacuated from within or very near to the inundated area. Of these, 3,087 people will seek temporary shelter in public shelters.

Of the 66 schools in New Haven, one is expected to experience at least moderate damage and two are expected to experience at least substantial damage; four are expected to experience loss of at least one day of use.

Hurricane Wind

Hazus-MH was used to model probabilistic hurricane wind impacts for the 10-, 20-, 50-, 100-, 200-, 500- and 1,000-year events. These annualized return periods compare to the Saffir-Simpson Scale in the following way:

- 10-year Tropical Depression/Tropical Storm
- 20-year Tropical Storm
- 50-year Tropical Storm/Category 1
- 100-year Category 1/Category 2
- 200-year Category 2
- 500-year Category 3
- 1000-year Category 3

The number of buildings estimated to be damaged and the resulting building-related economic losses are shown in **Table 4-122** and **Table 4-123.**

Table 4-122 Number of Buildings Damaged – New Haven

Return Period	Minor	Moderate	Severe	Destruction	Total
10-year	0	0	0	0	0
20-year	43	2	0	0	45
50-year	210	21	2	0	233
100-year	944	137	7	0	1,088
200-year	2,552	474	27	2	3,055
500-year	5,510	1,553	124	24	7,211
1,000-year	7,787	3,053	359	80	11,279

Table 4-123 Building-Related Economic Losses – New Haven

Return Period	Minor	Moderate	Severe	Destruction	Total
10-year	$0	$0	$0	$0	$0
20-year	$450,720	$0	$0	$0	$450,720
50-year	$19,400,820	$1,692,380	$106,050	$645,280	$21,844,540
100-year	$74,143,940	$9,302,000	$725,500	$1,574,940	$85,746,380
200-year	$171,251,910	$29,660,710	$2,843,310	$11,106,000	$214,861,930
500-year	$376,727,430	$104,092,820	$14,598,540	$50,065,950	$545,484,740
1,000-year	$652,460,380	$235,773,470	$30,763,540	$125,158,370	$1,044,155,760

Additionally, shelter needs and debris generation are modeled by Hazus-MH. Results are in Table 4-124.

Table 4-124 Other Hurricane Impacts – New Haven

Return Period	Debris Generated (Tons)	Households Displaced	Individuals Seeking Temporary Shelter
10-year	0	0	0
20-year	61	0	0
50-year	4,454	1	0
100-year	16,803	13	4
200-year	36,471	104	27
500-year	74,081	568	136
1,000-year	117,505	1,418	399

Other modeled impacts of this event include the following effects on essential facilities:

- After a 50-year hurricane, two of three hospitals are expected to experience at least moderate damage
- After a 100-year hurricane, two of three hospitals are expected to experience at least moderate damage
- After a 200-year hurricane:
    - 2 of 3 hospitals are expected to experience at least moderate damage; 0 out of 1,300 hospital beds are available on day one, 100% will be in service after one week
    - 2 of 66 schools will lose at least one day of use
- After a 500-year hurricane:
    - All 3 hospitals are expected to experience at least moderate damage; 0 out of 1,300 hospital beds are available on day one, 5% will be in service after one week, 100% will be operational by 30 days

  - 61 of 66 schools will lose at least one day of use
- After a 1000-year hurricane:
  - All 3 hospitals are expected to experience at least moderate damage; 0 out of 1,300 hospital beds are available on day one, 0% will be in service after one week, 100% will be operational by 30 days
  - 3 of 66 schools will experience at least moderate damage; all 66 will lose at least one day of use

Earthquake

An earthquake scenario was developed using Hazus-MH that models a magnitude 6.4 earthquake with an epicenter 10 kilometers below East Haddam. The number of buildings estimated to be damaged and the resulting building-related economic losses are shown in Table 4-125 and **Table 4-126.**

Table 4-125 Number of Buildings Damaged - New Haven

	Slight	Moderate	Extensive	Complete	Total
Count	4,836	2,458	713	143	8,150

Table 4-126 Building-Related Economic Losses – New Haven
Millions of dollars

	Residential	Commercial	Industrial	Others	Total
Losses	$373,900,000	$645,150,000	$48,500,000	$332,170,000	$1,399,710,000

Other modeled impacts of this event include:

- Essential Facilities:
  - No essential facilities experience at least moderate damage
  - 3 of 66 schools will lose at least 50% functionality on day one
- Transportation Infrastructure:
  - 2 highway bridges experience more than minor damage; losses total $145.72 million
  - 1 highway segment is less than 50% functional after day 7
  - 16 railway segments are less than 50% functional after day 7; total railway losses are $310,000
  - 1 light-rail segment is less than 50% functional after day 7; light rail facility damages equal $620,000
  - Damages to bus facilities equal $320,000
  - Damages to port facilities equal $5.10 million
- Utilities:
  - Potable water pipelines: 426 leaks and 106 breaks. Total water system losses are $1.92 million
  - Waste water pipelines: 305 leaks and 76 breaks, a loss of $5.57 million
  - Natural gas pipelines: 88 leaks and 22 breaks, a loss of $390,000
  - Electrical power facility losses total $13.95 million
  - Communication facility losses total $10,000
  - 717 households experience a loss of water service one day one; 28 have no service on day 3; all service is restored by day 7
- Shelter: 1,219 household will be displaced, with 987individuals seeking temporary shelter in public shelters
- 8 to 15 individuals may be killed, depending on the time of day the earthquake strikes

ANNUALIZED LOSS ESTIMATES

Table 4-127 shows annualized loss estimates (ALE) for each hazard. Estimates were derived from a number of sources, as described in the Methodology section, and included in column two of the table:

- NFIP: Historic flood insurance claims processed for the community
- PA: Historic Public Assistance grants awarded to the community
- State HMP: Localized estimates based on those presented in the 2014 Connecticut Hazard Mitigation Plan
- HAZUS: Hazus-MH results from modeling performed for this multi-jurisdictional plan
- State HAZUS: Hazus-MH results from modeling performed for the 2014 Connecticut Hazard Mitigation Plan

Hazus-MH results for flooding and earthquake hazards (as run for this multi-jurisdictional plan) were not able to be annualized, and so are not included in the table below.

Table 4-127 Annualized Loss Estimates by Hazard – New Haven

Hazard	Source	Annualized Loss Estimate
Flooding	NFIP	$129,331
	PA	$235,163
	State HMP	$29,914
Hurricane Wind Thunderstorm	HAZUS	$4,614,668
	PA	$117,582
	State HMP	$12,205
Tornado Winter Storm Dam Failure	State HMP	$1,273,744
	PA	$252,300
	State HMP	$946
	State HMP	$5,191
Wildfire	State HMP	$11,181
Earthquake	State HAZUS	$245,574

PROBLEM STATEMENTS—NEW HAVEN

Table 4-128 provides statements of particular interest with regard to primary hazards of concern, geographic areas of concern, and vulnerable community assets within the City of New Haven. If applicable, any noted potential solutions or mitigation actions are discussed with the problem statements.

Table 4-128 Problem Statements – New Haven

Primary Hazards of Concern	
Inland and Coastal Flooding	Inland and coastal flooding (including hurricane storm surge) are the primary hazards of concern, especially given that each is anticipated to get worse under future climate conditions. They are identified as the "most common naturally occurring event that disrupts quality of life for many residents."
High Winds	The city is particularly susceptible to damage from high winds (and heavy snow loads) due to its heavily treed landscape and high residential density.
Severe Winter Storms	Severe winter storms present some specific vulnerabilities, including high propensity for traffic accidents and impassable roads which inhibit the ability of emergency responders to reach trouble spots and/or vulnerable populations.
East Shore (Morris Cove), Fair Haven, Downtown &	The areas that are primarily prone to coastal flooding include the East Shore (Morris Cove) neighborhood, Fair Haven neighborhood, Downtown & Wooster Square/Mill

Wooster Square/Mill River, Long Wharf	River neighborhood, and the Long Wharf area. The Long Wharf area has large concentrations of commercial/industrial properties and the neighborhood boundary does not include any residential properties.
West, Mill, and Quinnipiac Rivers	The areas that are primarily prone to inland flooding include residential properties located adjacent to the West, Mill, and Quinnipiac Rivers. General areas of concern include the following: • Upper Middletown Avenue • Lower Middletown Avenue • Hemingway Creek • Quinnipiac Avenue • Downtown and Union Station • Fair Haven • Stiles Street and Port of New Haven • Fort Hale Park and Adjacent Areas • New Haven Flea Market Area (Boulevard at Adeline Street)
Downtown & other Urban Flooding Areas	Frequent flooding events also occur in areas of the city with insufficient drainage; where conditions may cause localized flash floods, and where tidal influences may exacerbate drainage problems. These inland flooding "hot spots" are illustrated in Figure 3-2 on page 3-9 of the plan. The Downtown area is particularly prone to inland flooding due to excess paved surfaces.
East Haven Town Line, South End Road, Airport	Other flood problems areas include limited conveyance under the railyard, and reduced capacity of outfalls due to sea-level rise and coastal storm surge also the area at the East Haven Town Line and South End Road (mainly during high tides and coastal storms), and the airport area was listed as the area experiencing flash floods by FEMA (area is primarily residential).
Morris Cove, Beverly Road in Westville, Middletown Avenue	The occurrence of sinkholes has been identified by City residents as occurring in the Morris Cove neighborhood, on Beverly Road in Westville, and along Middletown Avenue. The City also maintains a list of specific addresses for past complaints related to settling and sinkholes (see pages 9-1 and 9-2).
East Rock, West Rock, Roosevelt Drive, Myron Street	East Rock, West Rock, and two residential areas (near Roosevelt Drive and Myron Street) are most susceptible to rockslides, though presenting minor geographic risks in terms of loss of buildings or structures, and little to no risk of loss of life.
Vulnerable Community Assets	
Historic Assets	140 historic structures are in Special Flood Hazard Areas (SFHAs) and 10 structures are in a 3-foot sea level rise zone. Due to their proximity to a water body, the risk due to flood inundation and damage caused to the structure is high for these properties.
Transportation Infrastructure	Transportation infrastructure in New Haven at risk to adverse effects from sea-level rise includes the railroad station and track yards, the Tweed-New Haven Airport and parts of Interstate-95. Port facilities on the water's edge are also particularly susceptible to sea level rise. There is an electric grid station next to the train station.
Regional Water Authority	The Regional Water Authority's Operations and Administration Building (90 Sargent Drive) is in an identified SFHA. Flood mitigation measures recommended under Mitigation Action 6.
United Illuminating	The United Illuminating Grand Avenue sub-station is within a FEMA flood zone and within surge zones, and has been observed to be vulnerable to flooding. United Illuminating has installed flood barriers, but loss of this station during a flood would mean loss of power to a huge part of the east side of New Haven as well as other parts of the downtown.
Coastal Protective Infrastructure	Many seawalls, bulkheads, and other protective infrastructure assets have been identified for improvement and maintenance for the city, particularly to address flooding and shoreline deterioration in the following areas: Morris Cove; Fort Hale Park and Adjacent Areas; East Shore Park; Port and Terminal Area; Fair Haven and Quinnipiac River Park; Belle Dock Terminal and Long Wharf.
GNHWPCA	GNHWPCA building and infrastructure

CHANGES/IMPROVEMENTS SINCE 2014

- New Haven was not a part of the original Multi-Jurisdiction Hazard Mitigation Plan. These problem statements were developed from their 2017 Hazard Mitigation Plan and updated to reflect current conditions.

NORTH BRANFORD

CRITICAL FACILITIES – NORTH BRANFORD

Table 4-129 contains a list of critical facilities provided by the Town of North Branford. These are depicted on **Figure 4-65** along with FEMA flood zones.

Table 4-129 Critical Facilities – North Branford

Facility	Location	Emergency Power Supply?	Shelter?	In Floodplain or Coastal Flood Hazard Area?	In Surge Zones?
Emergency Services					
Fire Station #1	1531 Foxon Road	Yes	No	No	No
Fire Station #2	1370 Middletown Ave	Yes	No	No	No
Fire Station #3	1958 Middletown Ave	Yes	No	No	No
Ambulance Station (#4)	1351 Middletown Ave	Yes	No	No	No
Police Department/EOC	260 Forest Road	Yes	No	No	No
Municipal Facilities					
NB Intermediate School	654 Foxon Road	Yes	Yes	No	No
NB High School	49 Caputo Road	No	No	No	No
Jerome Harrison School	335 Foxon Road	No	No	No	No
Totoket Valley School	1388 Middletown Ave	No	No	No	No
Stanley Williams Community/Senior Center	1332 Middletown Ave	No	No	No	No
Public Works	290 Forest road	Yes	No	No	No
NB Town Hall	909 Foxon Road	No	No	No	No
Water and Wastewater					
Branford Road PS (sewer)	Branford Road	Yes	No	No	No
Twin Lakes Rd PS (sewer)	213 Twin Lakes Road	Yes	No	No	No
Mansfield Drive PS (sewer)	Mansfield Drive	Yes	No	No	No
Reeds Gap Rd PS (sewer)	Reeds Gap Road	Yes	No	No	No
White Hollow Rd PS (sewer)	White Hollow Road	Yes	No	No	No
Lake Gaillard Filtration Plant	725 Foxon Road	Yes	No	No	No

Facility	Location	Emergency Power Supply?	Shelter?	In Floodplain or Coastal Flood Hazard Area?	In Surge Zones?
Health Care and Senior Living Facilities					
Evergreen Woods Lifecare	88 Notch Hill Road	Yes	No	No	No
NB Elderly Housing	167 Branford Road	No	No	No	No
Mobile Home Park	224 Foxon Road	No	No	Yes	No

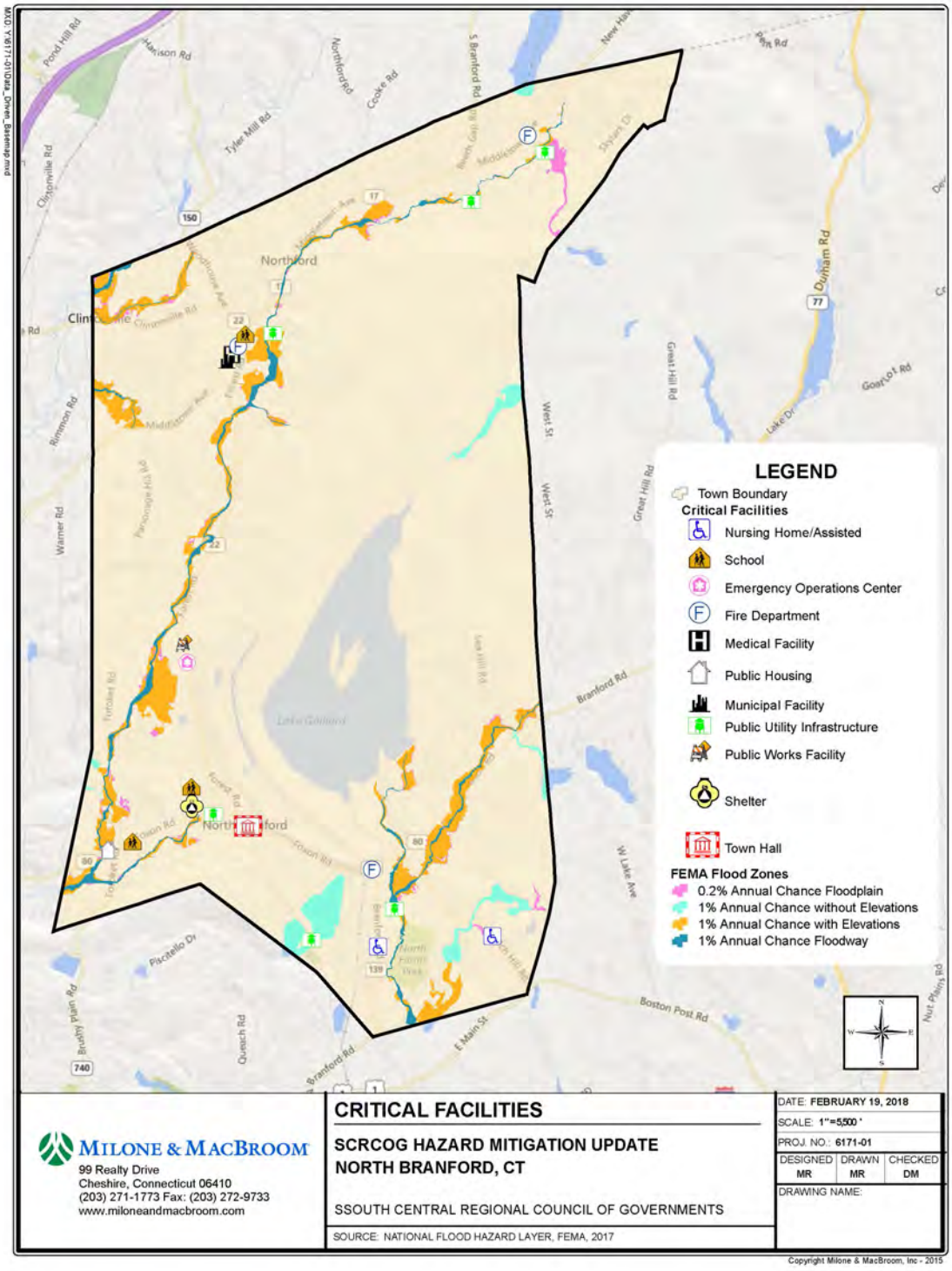


Figure 4-65 Critical Facilities and SFHA Map – North Branford

VULNERABLE ASSETS—NORTH BRANFORD

Vulnerable assets were identified by intersecting GIS-based asset inventories and demographic data with known hazard boundaries to determine the number of parcels, buildings, critical facilities, historic assets, and populations exposed to each hazard. This results in an estimation of vulnerable assets by hazard as shown in **Table 4-130.** **Figure 4-66** depicts the locations of historic resources.

Table 4-130 Vulnerable Assets by Hazard - North Branford

Hazard	Number of Parcels[306]	Number of Buildings[307]	Critical Facilities[308]	Historic Assets[309]	Population[310]
Extreme Temperatures	5,706	6,522	16	184	2,521
Hurricane/Tropical Storm	5,706	6,522	16	184	14,407
Severe Thunderstorm	5,706	6,522	16	184	14,407
Severe Winter Storm/Nor'easter	5,706	6,522	16	184	14,407
Tornado	5,706	6,522	16	184	14,407
Dam Failure[311]					
High Hazard (Class C)	701	450	0	43	1,152
Significant Hazard (Class B)	N/A	N/A	N/A	N/A	N/A
Drought	5,706	6,522	16	184	14,407
Flood[312]					
1-Percent-Annual-Chance	832	262	0	4	671
0.2-Percent-Annual-Chance	246	58	0	1	148
Earthquake	5,706	6,522	16	184	14,407
Wildfire	3,722	3,361	2	75	8,604

[306] Based on data provided by the Town of North Branford.
[307] Based on building numbers from CT ECO.
[308] Based on data from Hazus-MH.
[309] Based on data provided by the Town of North Branford.
[310] Based on population numbers from 2010 census data.
[311] Dam failure inundation mapping was available for Class C dams. Inundation mapping was not available for other dams located in the Town of Guilford.
[312] Results for the flood hazard are not cumulative. Numbers and values of assets for events of increasing magnitude should be read as "in addition to" the preceding magnitudes.

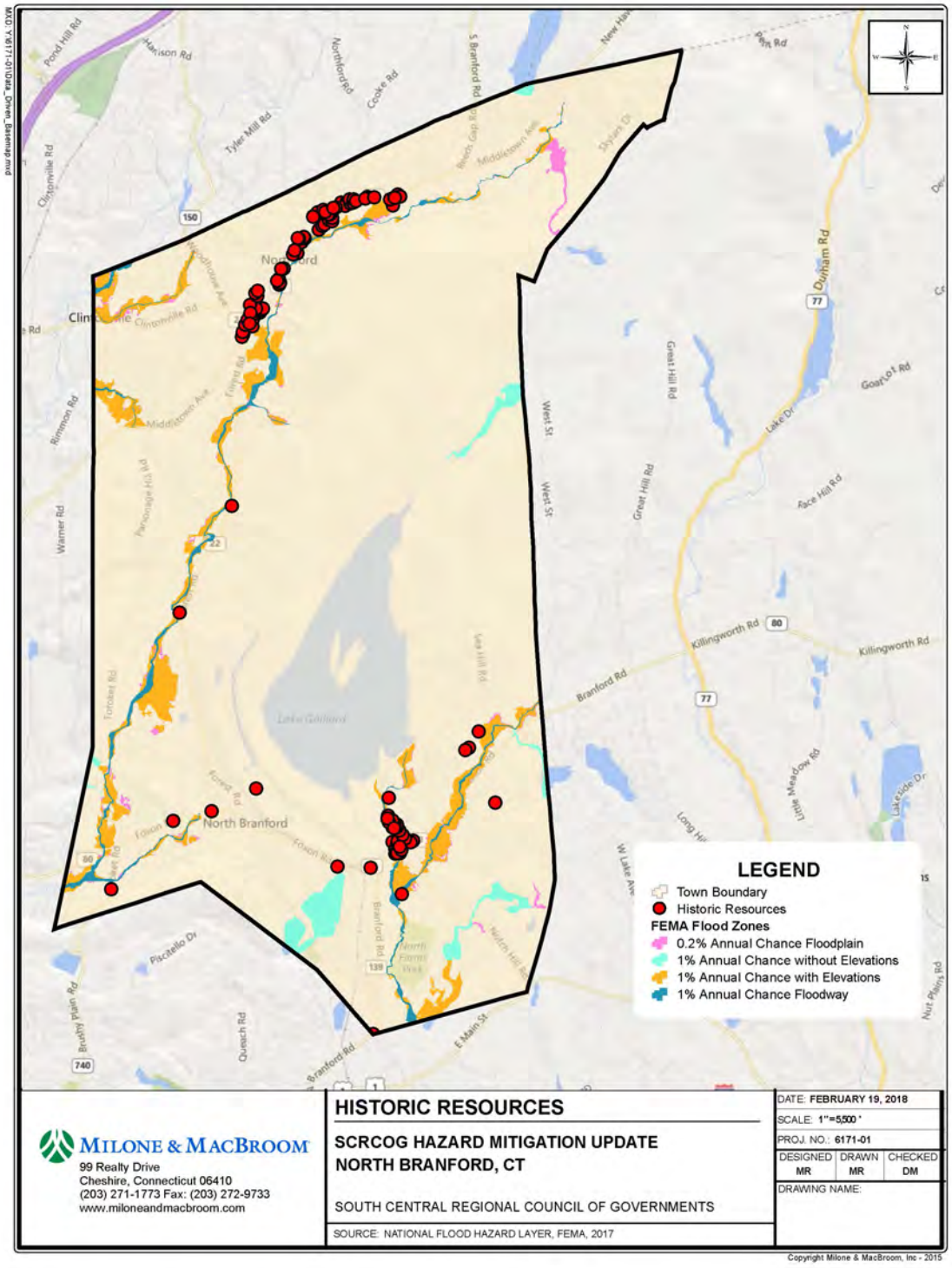


Figure 4-66 Historic Resources Map – North Branford

REPETITIVE LOSS AND SEVERE REPETITIVE LOSS PROPERTIES

In addition to the spatial analysis conducted above, summary information for repetitive flood loss and severe repetitive flood loss properties within the Town of North Branford also provides an indication of vulnerable assets, especially with regard to properties insured under the National Flood Insurance Program that have experienced repeated flooding (see **Table 4-131**).[313]

Table 4-131 Repetitive Flood Loss and Severe Repetitive Flood Loss Summary - North Branford

	Number of Losses	Number of Properties	Building Payments	Contents Payments	Total Payments
Repetitive Loss	22	9	$245,849	$119,219	$365,068
Severe Repetitive Loss	0	0	$0	$0	$0

The majority of the RL properties are single-family homes. One is a residential condominium unit and one is a dental clinic.

As of December 31, 2012, the Town of North Branford had a total of 68 claims totaling $457,504 in losses for all NFIP-insured structures. As of July 31, 2017, this number has not changed.

Figure 4-67 and **Figure 4-68** show dam and wildfire hazard areas within the Town of North Branford.

[313] Based on information provided by the Federal Emergency Management Agency current as of 12/31/2012.

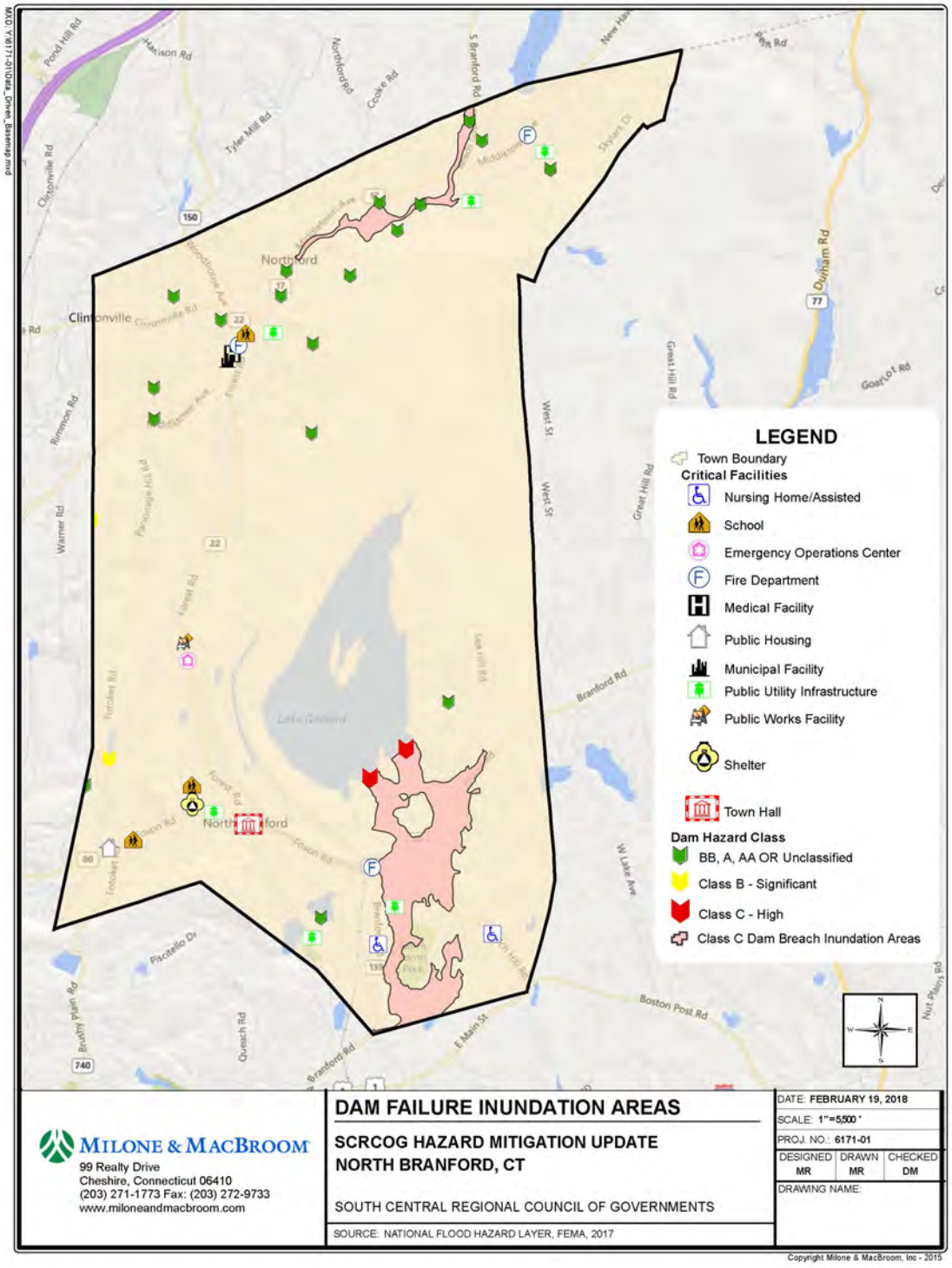


Figure 4-67 Dams Map – North Branford

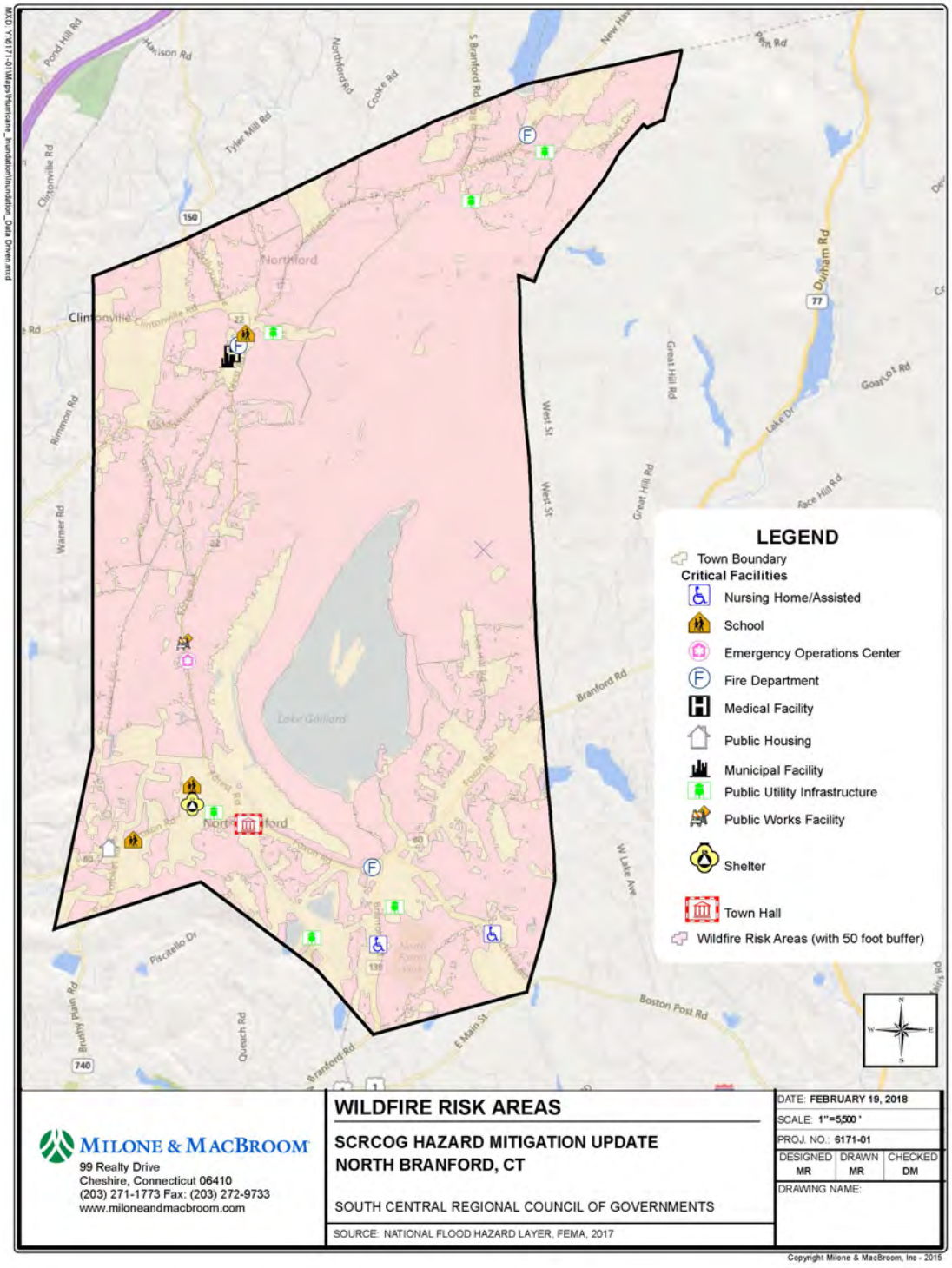


Figure 4-68 Wildfire Map – North Branford

POTENTIAL IMPACTS—NORTH BRANFORD

Table 4-132 shows the total estimated value of improved parcels (parcels that contain at least one building), critical facilities, and historic assets that intersect with known hazard areas, as an indicator of the potential impacts should a hazard event occur.

Table 4-132 Potential Impacts by Hazard - North Branford[314]

Hazard	Value of At-Risk Parcels[315]	Value of At-Risk Critical Facilities[316]	Value of At-Risk Historic Assets
Extreme Temperatures	$424,300,803	$78,491,781	$22,861,530
Hurricane/Tropical Storm	$424,300,803	$78,491,781	$22,861,530
Severe Thunderstorm	$424,300,803	$78,491,781	$22,861,530
Severe Winter Storm/Nor'easter	$424,300,803	$78,491,781	$22,861,530
Tornado	$424,300,803	$78,491,781	$22,861,530
Dam Failure[317]			
High Hazard	$166,162,631	$78,800	$7,617,510
Significant Hazard	N/A	N/A	N/A
Drought	$424,300,803	$78,491,781	$22,861,530
Flood[318][319]			
1-Percent-Annual-Chance	$221,108,383	$18,892,130	$3,833,770
0.2-Percent-Annual-Chance	$101,902,731	$811,100	$691,530
Earthquake	$424,300,803	$78,491,781	$22,861,530
Wildfire	$470,424,231	$52,643,881	$17,388,230

LOSS ESTIMATES—NORTH BRANFORD

DETAILED HAZUS-MH LOSS ESTIMATES

Riverine Flood

Estimated building losses for the riverine flood hazard generated by Hazus-MH are broken down into two categories: direct building losses and business interruption losses. The direct building losses are the estimated costs to repair or replace the damage caused to the building and its contents. The business interruption losses are the losses associated with the inability to operate a business because of the damage sustained during the flood.

[314] Potential Impacts are based on parcel exposure, not building exposure. It is possible for a historic asset or critical facility building to not be exposed, yet its associated parcel intersects a hazard area. The parcel value will then be reflected in the Potential Impacts Table.
[315] Based on estimated exposure values from Hazus-MH (building values only).
[316] Based on estimated building values from Hazus-MH.
[317] Dam failure inundation mapping was available for Class C dams. Inundation mapping was not available for other dams located in the town.
[318] Results for the flood hazard are not cumulative. Numbers and values of assets for events of increasing magnitude should be read as "in addition to" the preceding magnitudes.
[319] Results for the hurricane inundation areas are cumulative. Numbers and values of assets for events of increasing magnitude should be read as "consisting of" the preceding magnitudes.

Business interruption losses also include the temporary living expenses for those people displaced from their homes because of the flood (see **Table 4-133**).

Table 4-133 Riverine Flood Loss Estimates (1-Percent-Annual-Chance Flood) - North Branford

	2014 Results Millions of Dollars					2017 Results Millions of Dollars				
	Residential	Commercial	Industrial	Others	Total	Residential	Commercial	Industrial	Others	Total
Direct Building Loss										
Building	$10.17	$2.69	$2.04	$0.25	$15.15	$8.18	$1.91	$3.18	$0.17	$13.44
Contents	$5.37	$8.53	$4.03	$1.10	$19.03	$3.56	$6.96	$7.83	$0.86	$19.22
Inventory	$0	$0.18	$0.48	$0.05	$0.71	$0.00	$0.12	$0.63	$0.04	$0.79
Subtotal	**$15.54**	**$11.40**	**$6.55**	**$1.40**	**$34.89**	**$11.74**	**$9.00**	**$11.64**	**$1.07**	**$33.45**
Business Interruption										
Income	$0	$0.02	$0	$0	$0.02	$0.00	$0.01	$0.00	$0.00	$0.01
Relocation	$0.01	$0	$0	$0	$0.01	$0.01	$0.00	$0.00	$0.00	$0.01
Rental Income	$0	$0	$0	$0	$0	$0.00	$0.00	$0.00	$0.00	$0.00
Wage	$0	$0.02	$0	$0.04	$0.06	$0.00	$0.02	$0.00	$0.01	$0.03
Subtotal	**$0.01**	**$0.04**	**$0**	**$0.04**	**$0.09**	**$0.01**	**$0.03**	**$0.00**	**$0.01**	**$0.05**
TOTAL	**$15.54**	**$11.44**	**$6.55**	**$1.45**	**$34.98**	**$11.75**	**$9.03**	**$11.64**	**$1.08**	**$33.50**

In addition, the Hazus-MH model estimates 207 households will be displaced due to the flood. Displacement includes households evacuated from within or very near to the inundated area. Of these, 307 people will seek temporary shelter in public shelters.

These inland flooding results show a minor decrease in the estimated losses from a 1% annual-chance flood between the previous and the current Hazus-MH results. The difference in results is most likely explained by incremental improvements in the Hazus-MH program over the last few years.

Hurricane Wind

Hazus-MH was used to model probabilistic hurricane wind impacts for the 10-, 20-, 50-, 100-, 200-, 500- and 1,000-year events. These annualized return periods compare to the Saffir-Simpson Scale in the following way:

- 10-year Tropical Depression/Tropical Storm
- 20-year Tropical Storm
- 50-year Tropical Storm/Category 1
- 100-year Category 1/Category 2
- 200-year Category 2
- 500-year Category 3
- 1000-year Category 3

The number of buildings estimated to be damaged and the resulting building-related economic losses are shown in **Table 4-134** and **Table 4-135.**

Table 4-134 Number of Buildings Damaged - North Branford

	Return Period	Minor	Moderate	Severe	Destruction	Total
2014 Results	10-year	$0	$0	$0	$0	$0
	20-year	$110,110	$9,340	$4,900	$1,160	$125,510
	50-year	$2,924,340	$78,850	$31,750	$13,800	$3,048,740
	100-year	$8,248,300	$487,730	$246,050	$98,250	$9,080,330
	200-year	$23,901,970	$2,036,080	$1,271,890	$498,840	$27,708,780
	500-year	$87,550,610	$7,593,780	$5,537,870	$1,728,200	$102,410,460
	1,000-year	$184,750,300	$18,947,540	$12,792,980	$3,875,030	$220,365,850
2017 Results	10-year	$0	$0	$0	$0	$0
	20-year	$12,350	$0	$0	$0	$12,350
	50-year	$1,790,340	$34,700	$11,630	$5,860	$1,842,530
	100-year	$6,111,670	$172,080	$76,520	$33,090	$6,393,360
	200-year	$13,354,670	$763,910	$355,470	$163,560	$14,637,610
	500-year	$32,007,610	$2,273,630	$1,463,070	$626,270	$36,370,580
	1,000-year	$61,969,910	$4,485,500	$3,228,940	$1,261,420	$70,945,780

Table 4-135 Other Hurricane Impacts – North Branford

Return Period	Households Displaced	Individuals Seeking Temporary Shelter	Debris (Tons)
10-year	0	0	0
20-year	2	0	0
50-year	125	0	0
100-year	6,487	3	1
200-year	10,116	11	2
500-year	19,229	36	6
1,000-year	33,736	72	14

Other modeled impacts of this event include the following effects on essential facilities:

- After a 500-year hurricane, all 6 schools are expected to lose at least one day of use
- After a 1,000-year hurricane, all 6 schools are expected to lose at least one day of use

These hurricane wind results show a decrease in the losses from high wind events between previous and current Hazus-MH results. The difference in results is most likely explained by incremental improvements in the Hazus-MH program over the last few years.

Earthquake

An earthquake scenario was developed using Hazus-MH that models a magnitude 6.4 earthquake with an epicenter 10 kilometers below East Haddam. The number of buildings estimated to be damaged and the resulting building-related economic losses are shown in **Table 4-136** and **Table 4-137.**

Table 4-136 Number of Buildings Damaged – North Branford

	Slight	Moderate	Extensive	Complete	Total
Count	1,241	545	169	59	2,014

Table 4-137 Building-Related Economic Losses - North Branford

	Residential	Commercial	Industrial	Others	Total
Losses	$60,000,000	$54,690,000	28,860,000	$10,410,000	$153,950,000

Other modeled impacts of this event include:

- Essential Facilities:
  - No essential facilities experience moderate damage
  - Following the event, the functionality of essential facilities is as follows:
    - Schools: zero of six are more than 50% functional the day after the event
    - Emergency Operations Centers: zero of one is more than 50% functional the day after the event
    - Police Stations: zero of one is more than 50% functional the day after the event
- Transportation Infrastructure:
  - Only 29of 31 highway segments are more than 50% functional after one week
  - Two highway bridge experiences at least moderate damage; 10 of 11 are more that 50% functional after day one, all 11 are functional after one week; total losses are $1.74 million
  - One of five railway segments is less than 50% functional for more than one week
- Utilities:
  - Potable water pipelines: 68 leaks and 17 breaks. Total water system losses are $3.94 million
  - Wastewater pipelines: 49 leaks and 12 breaks, a loss of $220,000
  - Natural gas pipelines: 14 leaks and 4 breaks, a loss of $60,000
  - No loss of water or electric service
- Shelter: 103 households will be displaced, with 50 individuals seeking temporary shelter in public shelters
- 3 to 26 individuals may require hospitalization and 1 to 6 individuals may be killed, depending on the time of day the earthquake strikes

ANNUALIZED LOSS ESTIMATES

Table 4-138 **shows** annualized loss estimates (ALE) for each hazard. Estimates were derived from a number of sources, as described in the Methodology section, and included in column two of the table:

- NFIP: Historic flood insurance claims processed for the community
- PA: Historic Public Assistance grants awarded to the community
- State HMP: Localized estimates based on those presented in the 2014 Connecticut Hazard Mitigation Plan
- HAZUS: Hazus-MH results from modeling performed for this multi-jurisdictional plan
- State HAZUS: Hazus-MH results from modeling performed for the 2014 Connecticut Hazard Mitigation Plan

Hazus-MH results for flooding and earthquake hazards (as run for this multi-jurisdictional plan) were not able to be annualized, and so are not included in the table below.

Table 4-138 Annualized Loss Estimates by Hazard – North Branford

Hazard	Source	Annualized Loss Estimate
Flooding	NFIP	$11,731
	PA	$8,554
	State HMP	$3,317
Hurricane Wind Thunderstorm	HAZUS	$323,005
	PA	$4,277
	State HMP	$1,353
Tornado Winter Storm Dam Failure	State HMP	$141,232
	PA	$43,137
	State HMP	$105
	State HMP	$576
Wildfire	State HMP	$14,888
Earthquake	State HAZUS	$27,229

PROBLEM STATEMENTS—NORTH BRANFORD

Table 4-139 provides statements of particular interest with regard to primary hazards of concern, geographic areas of concern, and vulnerable community assets within the Town of North Branford. If applicable, any noted potential solutions or mitigation actions are discussed with the problem statements.

Table 4-139 Problem Statements – North Branford

Primary Hazards of Concern	
Trees	**Trees**-related hazards are a big concern during **hurricane/tropical storm** and **severe winter storm** events, particularly downing electrical lines, and when falling and blocking roads that isolate many rural areas throughout town and pose life/safety threat due to no emergency access. This is a specific concern for schools / school bus routes. There is a big concern over diseased trees. Public Works removes two-three trees a day that are dead. United Illuminating does an excellent job removing trees and limbs from power lines.
Inland/riverine flooding	**Inland/riverine flooding** is the greatest concern. Whole town is a watershed, and the South Central CT Regional Water Authority owns 1/3 of the land surrounding, and especially north, of Lake Gaillard (major reservoir). Older, pre-FIRM structures are occasionally impacted by minor flooding following heavy rains. Last major flood was in 1992. Existing floodplain maps are deemed accurate based on experience.
Drought	**Drought** is of some concern to North Branford, which is a farming community with many commercial vegetable farms.
Dam failure	**Dam failure** – The Lake Gaillard Dam would cause severe downstream flooding in North Branford and Branford. RWA operates Lake Gaillard Dam, which impacts Branford River and Farm River.
Geographic Areas of Concern	
Foxon Road @ Farm River	Foxon Road @ Farm River – flash flooding potential after heavy rains (5-6 inches) has caused minor damage in past. Attributed to possible debris blockage issue for culvert under roadway. • Potential solutions/mitigation actions: upstream impoundment and/or additional floodplain storage/stream restoration, which would alleviate flooding in this area.
Harrison Road/ Lea Road/	Harrison Road/ Lea Road/ Circle Drive @ Branford River and Munger Brook –

Circle Drive @ Branford River and Munger Brook	flooding results from upstream spillway at Lake Gaillard Dam, which affects homes every 10-20 years (mostly garage, some basement flooding). All homes are pre-FIRM, constructed in 1950s-1960s. Dam has undergone some recent improvements.
Foxon Road @ Munger Brook	Foxon Road @ Munger Brook – occasional flooding along roadway between Fowler Road and W. Pond Road (south of Giant Oak Shopping Center).
Valley Road @ Notch Hill Brook	Valley Road @ Notch Hill Brook (including Hemlock Drive, Crossfield Road, Norwill Drive) – susceptible to occasional flooding.
Residential areas along Walnut Lane	Residential areas along Walnut Lane, between Reeds Gap Road and Lanes Pond Road – occasional nuisance flooding and ponding along roadways from Farm River, requiring debris clean up.
Vulnerable Community Assets	
Town Hall	Town Hall not equipped with generator or quick-connects for backup generator power. EOC has been relocated back to Police Station.
Evergreen Woods	Evergreen Woods – senior living center @ 88 Notch Hill Road. 240 units on large campus setting, resulting in high concentration of senior citizens that may have special needs before, during or after major disaster events. Hospital is on generator but not residential housing units. • 2 critical facilities are within proximity to a significant hazard dam. Further study is necessary to determine if a dam failure could potentially impact either or both facilities.
Mobile Home Park	Mobile Home Park (224 Foxon Road) – twenty units that are in the floodplain.
Intermediate School	Intermediate School is the regional shelter – it has a generator; however, building is full of glass and generator powers the glass filled part of the building.

NORTH HAVEN

CRITICAL FACILITIES – NORTH HAVEN

Table 4-140 contains a list of critical facilities provided by the Town of North Haven. These are depicted on Figure 4-69 along with FEMA flood zones.

Table 4-140 Critical Facilities – North Haven

Facility	Location	Emergency Power Supply?	Shelter?	In Floodplain or Coastal Flood Hazard Area?	In Surge Zones?
Emergency Services					
Montowese Fire Station	282 Quinnipiac Ave	Yes	No	No	N/A
Fire Station	11 Broadway	Yes	No	No	N/A
Fire Station	1339 Ridge Road	No	No	No	N/A
Fire Station	366 Washington Ave	No	No	No	N/A
Police Station	8 Linsley St	Yes	No	No	N/A
Municipal Facilities					
Town Hall	18 Church St.	Yes	No	No	N/A

Facility	Location	Emergency Power Supply?	Shelter?	In Floodplain or Coastal Flood Hazard Area?	In Surge Zones?
Public Works	110 Elm St.	Yes	No	No	N/A
Middle School	55 Bailey Road	Yes	No	No	N/A
Shelters					
High School	221 Elm St.	Yes	Yes	No	N/A
Senior Center	189 Pool Road	Yes	Yes (Warming Only)	No	N/A
Water and Wastewater					
Pump Stations		Some	No		N/A

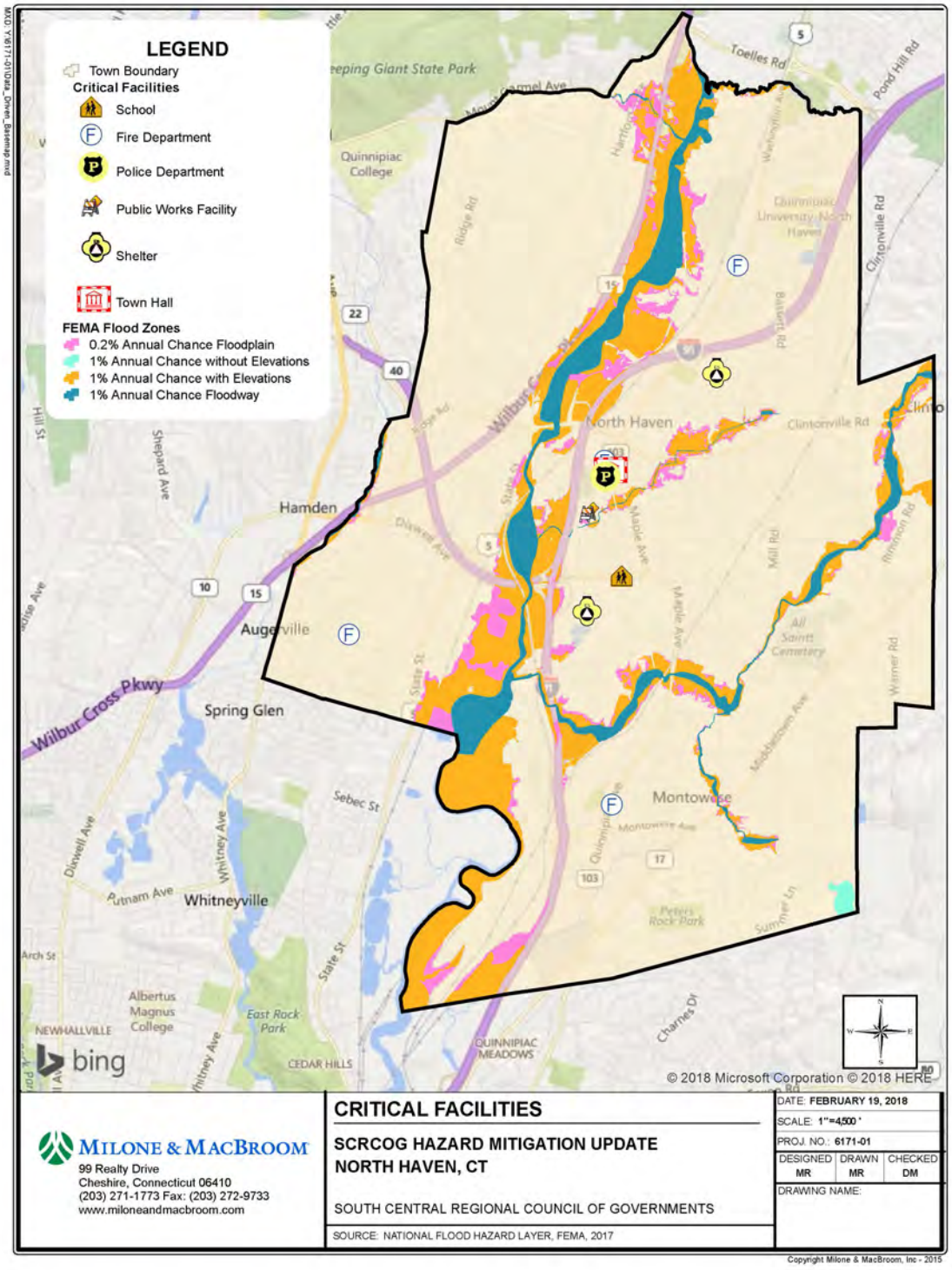


Figure 4-69 Critical Facilities and SFHA Map – North Haven

VULNERABLE ASSETS—NORTH HAVEN

Vulnerable assets were identified by intersecting GIS-based asset inventories and demographic data with known hazard boundaries to determine the number of parcels, buildings, critical facilities, historic assets, and populations exposed to each hazard. This results in an estimation of vulnerable assets by hazard as shown in Table 4-141. Figure 4-70 depicts the locations of historic resources.

Table 4-141 Vulnerable Assets by Hazard - North Haven

Hazard	Number of Parcels[320]	Number of Buildings[321]	Critical Facilities[322]	Historic Assets[323]	Population[324]
Extreme Temperatures	9,114	10,923	10	83	4,794
Hurricane/Tropical Storm	9,114	10,923	10	83	24,093
Severe Thunderstorm	9,114	10,923	10	83	24,093
Severe Winter Storm/Nor'easter	9,114	10,923	10	83	24,093
Tornado	9,114	10,923	10	83	24,093
Dam Failure					
High Hazard (Class C)	0	0	0	0	0
Significant Hazard[325] (Class B)	N/A	N/A	N/A	N/A	N/A
Drought	9,114	10,923	10	83	24,093
Flood[326]					
1-Percent-Annual-Chance	799	294	0	3	700
0.2-Percent-Annual-Chance	577	299	0	0	712
Zone VE	147	20	0	0	48
Category 1 Storm Surge	235	74	0	0	176
Category 2 Storm Surge	306	148	1	6	352
Category 3 Storm Surge	318	149	0	11	352
Category 4 Storm Surge	124	125	0	0	318
Sea Level Rise	9,114	10,923	10	83	24,093
Earthquake	2,711	1,716	1	2	4,084
Wildfire	799	294	0	3	700

[320] Based on data provided by the Town of East Haven.
[321] Based on building numbers from CT ECO.
[322] Based on a combination of data provided by the Town of East Haven and Hazus-MH.
[323] Data for historic assets was not available at the time of this analysis.
[324] Based on population numbers from 2010 census data.
[325] Dam failure inundation mapping was available for Class C dams. Inundation mapping was not available for other dams located in the town.
[326] Results for the flood hazard are not cumulative. Numbers and values of assets for events of increasing magnitude should be read as "in addition to" the preceding magnitudes.

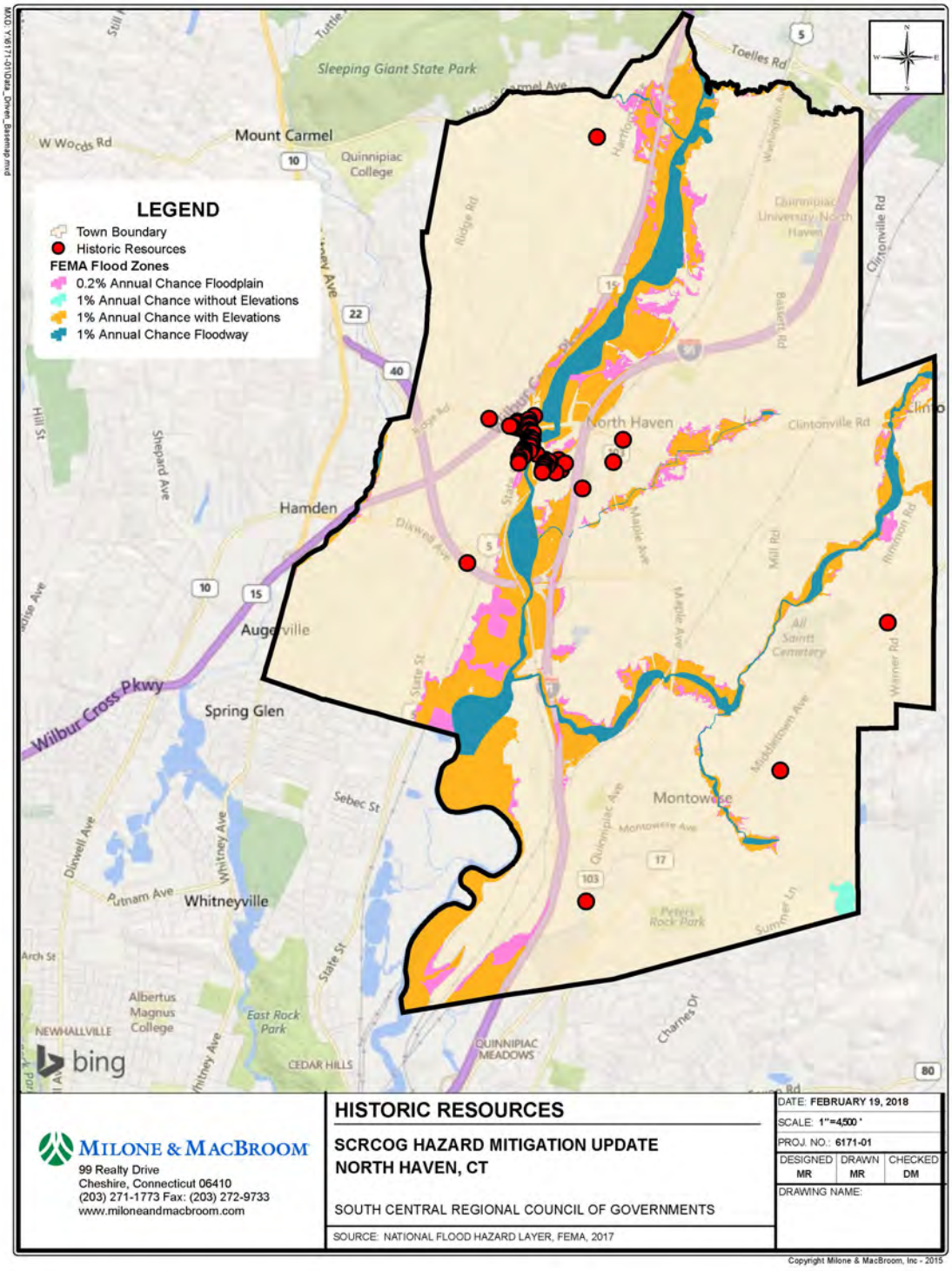


Figure 4-70 Historic Resources Map – North Haven

Repetitive Loss and Severe Repetitive Loss Properties

In addition to the spatial analysis conducted above, summary information for repetitive flood loss and severe repetitive flood loss properties within the Town of North Haven also provides an indication of vulnerable assets, especially with regard to properties insured under the National Flood Insurance Program that have experienced repeated flooding (see Table 4-142).[327]

Table 4-142 Repetitive Flood Loss and Severe Repetitive Flood Loss Summary - North Haven

	Number of Losses	Number of Properties	Building Payments	Contents Payments	Total Payments
Repetitive Loss	43	15	$559,429	$135,612	$695,041
Severe Repetitive Loss	19	4	$249,075	$146,849	$395,924

The majority of the RL properties are single-family homes. Only four RL properties are non-residential, and these appear to be commercial and industrial uses.

As of December 31, 2012, the Town of North Haven had a total of 150 claims totaling $1,547,692 in losses for all NFIP-insured structures. By July 31, 2017, that number had grown to 152 claims totaling $1,548,810.

Figure 4-71 through Figure 4-74 show dams, storm surge, sea level rise, and wildfire hazard areas within the Town of North Haven.

[327] Based on information provided by the Federal Emergency Management Agency current as of 12/31/2012.

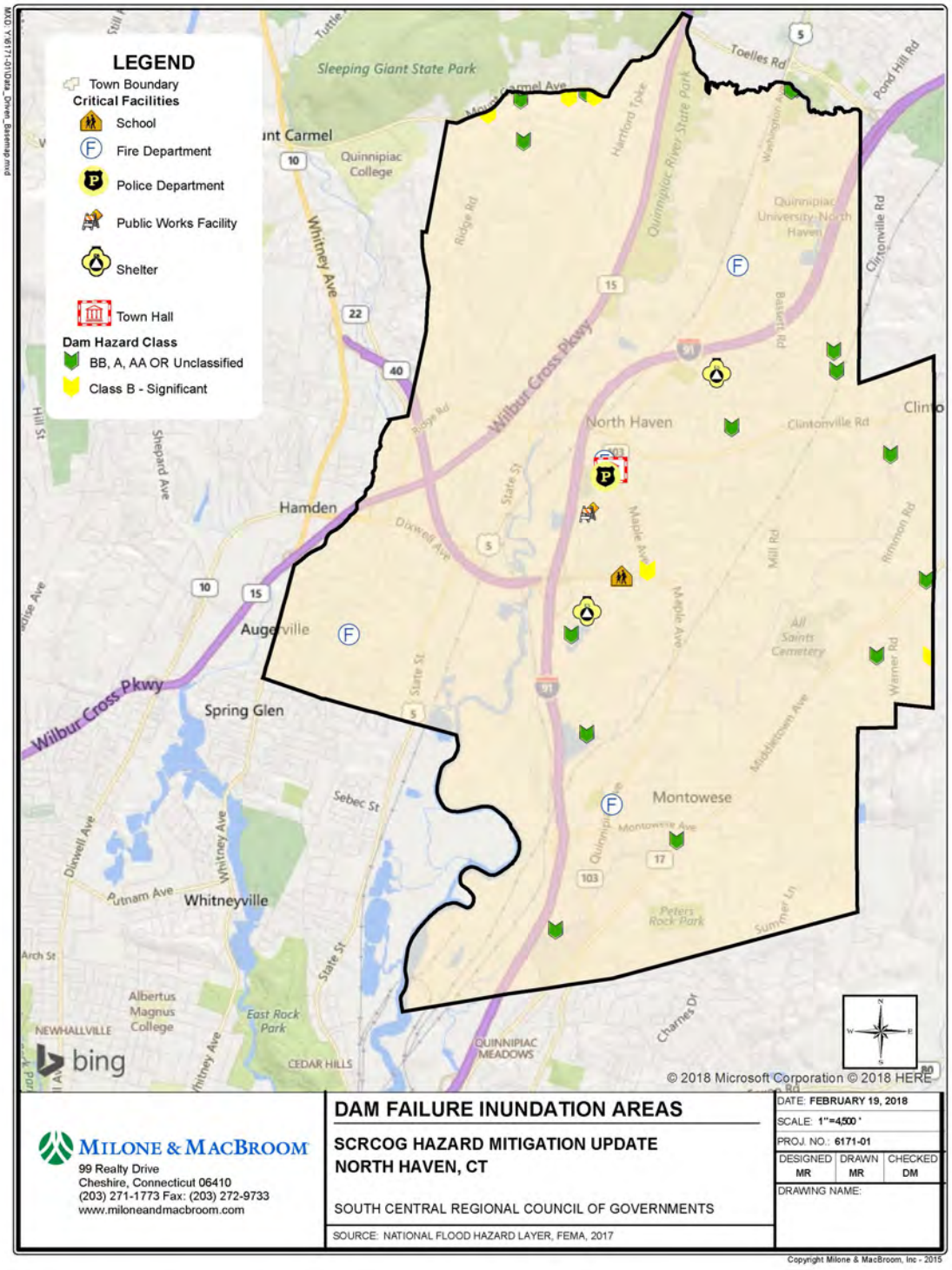


Figure 4-71 Dams Map – North Haven

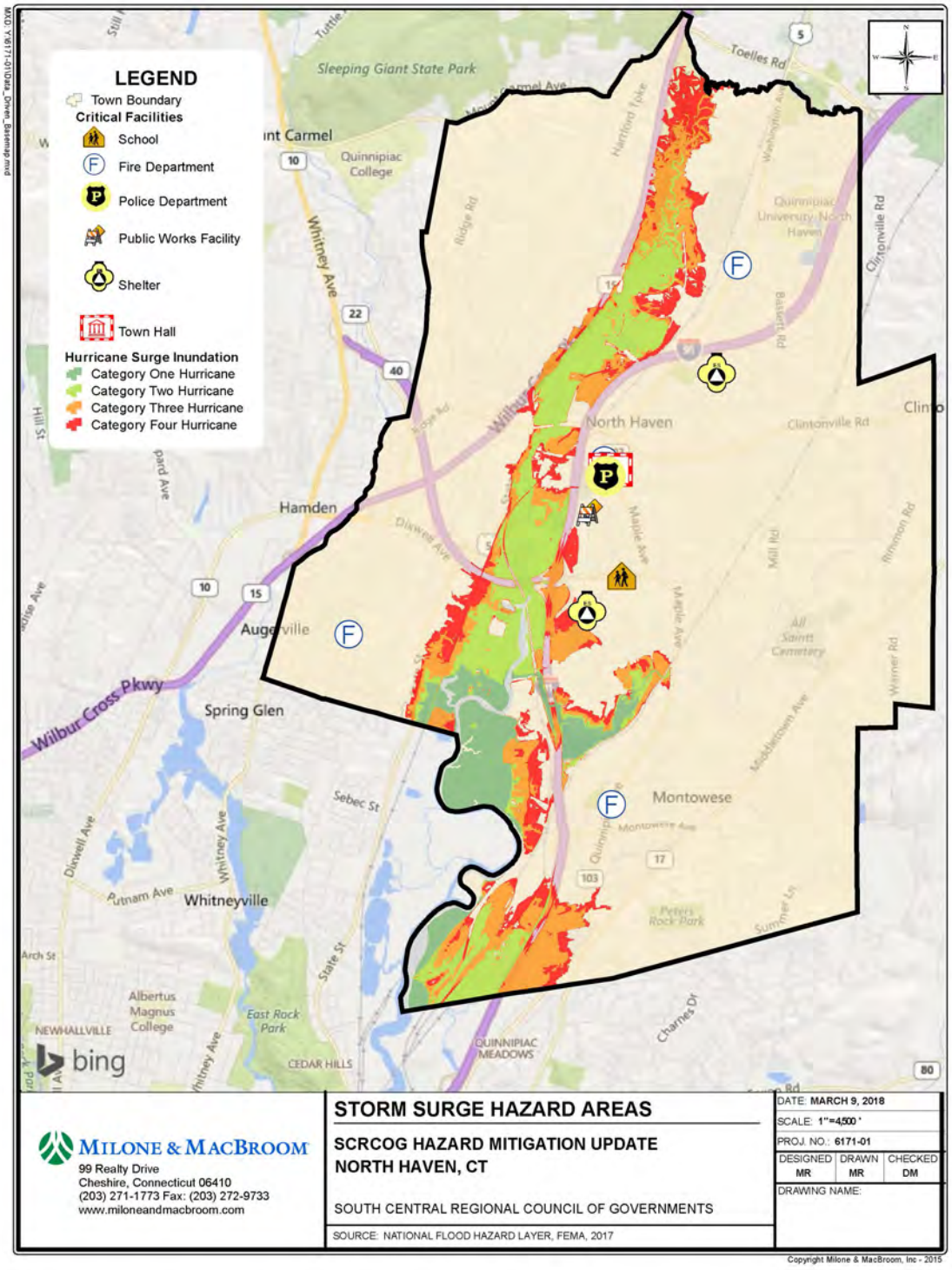


Figure 4-72 Hurricane Inundation Map – North Haven

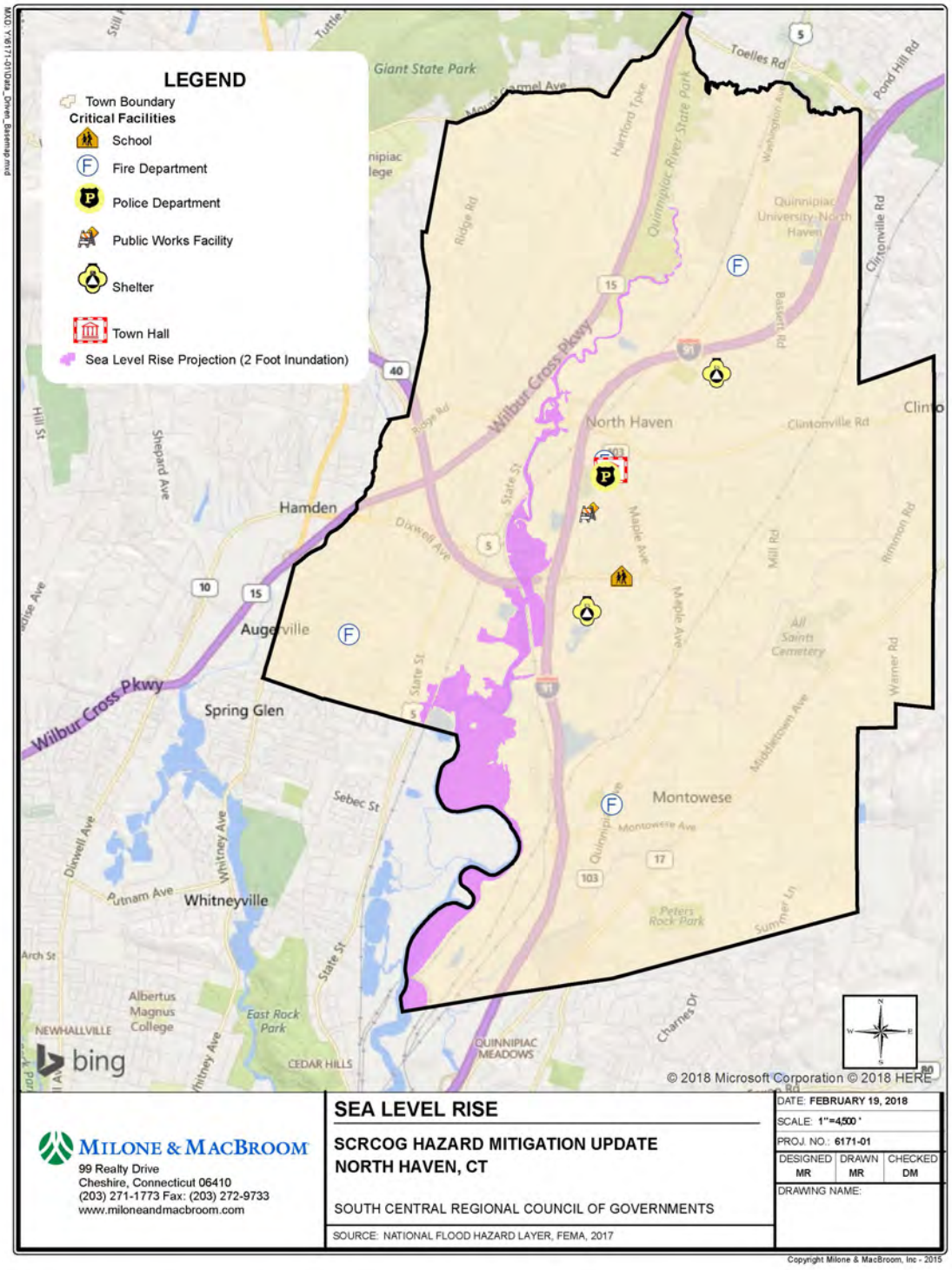


Figure 4-73 Sea Level Rise Map – North Haven

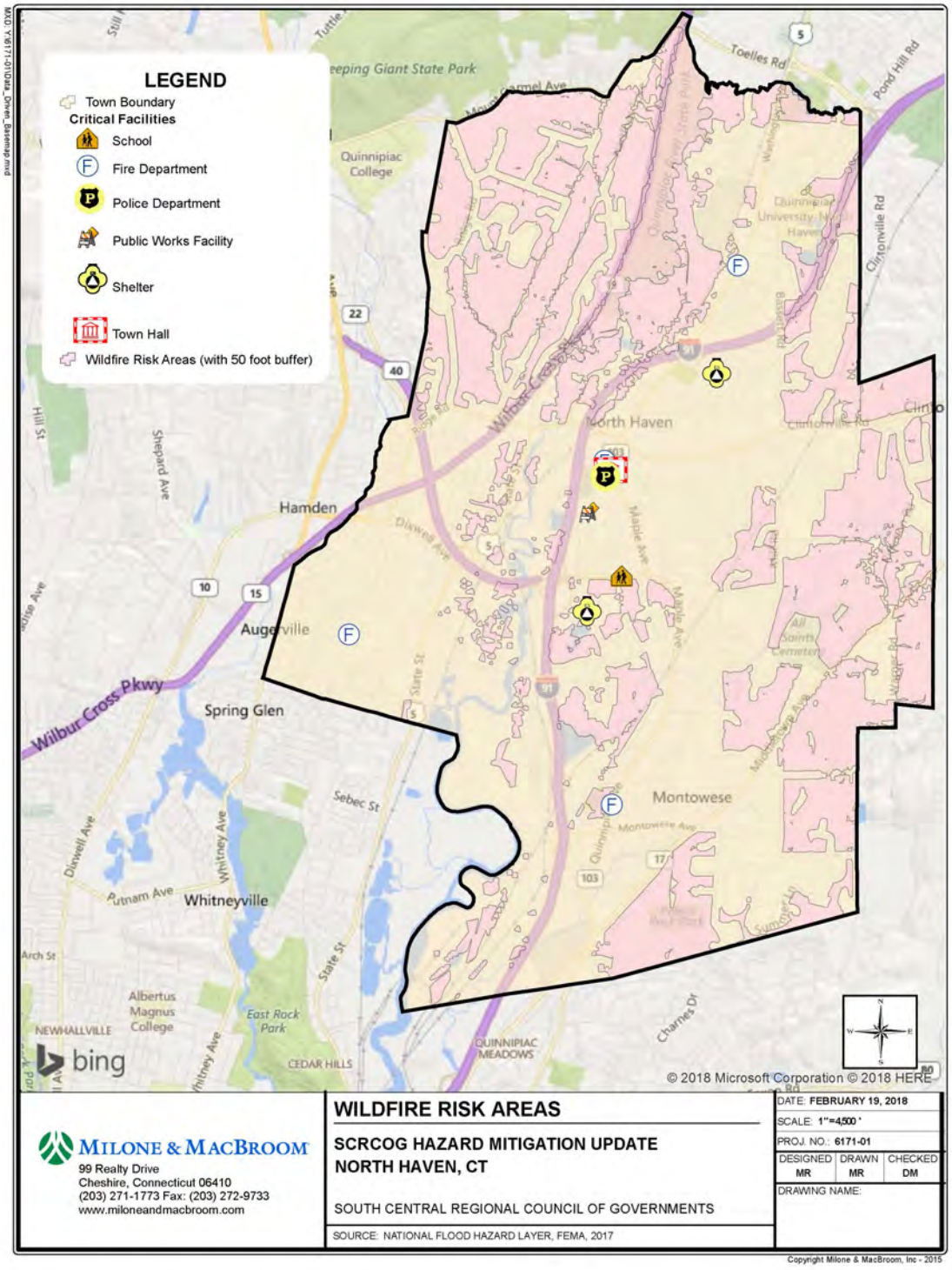


Figure 4-74 Wildfire Map – North Haven

POTENTIAL IMPACTS—NORTH HAVEN

Table 4-143 shows the total estimated value of improved parcels (parcels that contain at least one building), critical facilities, and historic assets that intersect with known hazard areas, as an indicator of the potential impacts should a hazard event occur.

Table 4-143 Potential Impacts by Hazard - North Haven[328]

Hazard	Value of At-Risk Parcels[329]	Value of At-Risk Critical Facilities[330]	Value of At-Risk Historic Assets[331]
Extreme Temperatures	$978,609,583	$93,625,000	$33,923,100
Hurricane/Tropical Storm	$978,609,583	$93,625,000	$33,923,100
Severe Thunderstorm	$978,609,583	$93,625,000	$33,923,100
Severe Winter Storm/Nor'easter	$978,609,583	$93,625,000	$33,923,100
Tornado	$978,609,583	$93,625,000	$33,923,100
Dam Failure			
High Hazard (Class C)	$0	$0	$0
Significant Hazard[332] (Class B)	N/A	N/A	N/A
Drought	$978,609,583	$93,625,000	$33,923,100
Flood[333][334]			
1-Percent-Annual-Chance	$432,618,855	$1,109,600	$21,148,600
0.2-Percent-Annual-Chance	$296,449,885	$1,109,600	$1,491,300
Zone VE	$133,890,600	$0	$0
Category 1 Storm Surge	$228,072,800	$0	$21,148,600
Category 2 Storm Surge	$436,365,072	$0	$23,645,600
Category 3 Storm Surge	$528,331,162	$0	$28,797,400
Category 4 Storm Surge	$174,836,400	$0	$20,852,300
Sea Level Rise	$978,609,583	$93,625,000	$33,923,100
Earthquake	$1,177,497,370	$87,002,800	$22,780,900
Wildfire	$432,618,855	$1,109,600	$21,148,600

[328] Potential Impacts are based on parcel exposure, not building exposure. It is possible for a historic asset or critical facility building to not be exposed, yet its associated parcel intersects a hazard area. The parcel value will then be reflected in the Potential Impacts Table.
[329] Based on data provided by the Town of North Haven.
[330] Based on data provided by the Town of North Haven.
[331] Data for historic assets was not available at the time of this analysis.
[332] Dam failure inundation mapping was available for Class C dams. Inundation mapping was not available for other dams located in the town.
[333] Results for the flood hazard are not cumulative. Numbers and values of assets for events of increasing magnitude should be read as "in addition to" the preceding magnitudes.
[334] Results for the hurricane inundation areas are cumulative. Numbers and values of assets for events of increasing magnitude should be read as "consisting of" the preceding magnitudes.

LOSS ESTIMATES—NORTH HAVEN

DETAILED HAZUS-MH LOSS ESTIMATES

Riverine Flood

Estimated building losses for the riverine flood hazard generated by Hazus-MH are broken down into two categories: direct building losses and business interruption losses. The direct building losses are the estimated costs to repair or replace the damage caused to the building and its contents. The business interruption losses are the losses associated with the inability to operate a business because of the damage sustained during the flood. Business interruption losses also include the temporary living expenses for those people displaced from their homes because of the flood (see Table 4-144).

Table 4-144 Riverine Flood Loss Estimates (1-Percent-Annual-Chance Flood) - North Haven

	2014 Results Millions of Dollars					2017 Results Millions of Dollars				
	Residential	Commercial	Industrial	Others	Total	Residential	Commercial	Industrial	Others	Total
Direct Building Loss										
Building	$6.75	$5.79	$8.23	$0.10	$20.87	$10.26	$2.64	$4.04	$0.07	$17.01
Contents	$3.43	$14.25	$23.08	$0.46	$41.22	$4.60	$7.35	$11.89	$0.39	$24.23
Inventory	$0	$0.56	$3.45	$0.02	$4.03	$0.00	$0.21	$1.43	$0.01	$1.64
Subtotal	**$10.18**	**$20.60**	**$34.76**	**$0.58**	**$66.12**	**$14.87**	**$10.20**	**$17.36**	**$0.46**	**$42.88**
Business Interruption										
Income	$0	$0.08	$0.01	$0	$0.09	$0.00	$0.02	$0.00	$0.00	$0.02
Relocation	$0.01	$0.02	$0	$0	$0.03	$0.02	$0.00	$0.00	$0.00	$0.02
Rental Income	$0	$0.01	$0	$0	$0.01	$0.00	$0.00	$0.00	$0.00	$0.00
Wage	$0	$0.07	$0	$0	$0.07	$0.00	$0.03	$0.00	$0.00	$0.03
Subtotal	**$0.01**	**$0.18**	**$0.01**	**$0**	**$0.20**	**$0.02**	**$0.05**	**$0.00**	**$0.00**	**$0.06**
TOTAL	**$10.19**	**$20.78**	**$34.77**	**$0.58**	**$66.32**	**$14.88**	**$10.24**	**$17.36**	**$0.46**	**$42.94**

In addition, the Hazus-MH model estimates 258 households will be displaced due to the flood. Displacement includes households evacuated from within or very near to the inundated area. Of these, 445 people will seek temporary shelter in public shelters.

These inland flooding results show a decrease in the estimated losses from a 1% annual-chance flood between the previous and the current Hazus-MH results. It is likely that the change in the definitions of inland and coastal flood zones is the primary reason for those differences; in the previous Plan none of North Haven's flood zones were defined as coastal, while in this edition a portion of estimated flood losses are expected to be caused by coastal flooding, as described in the next section.

Coastal Flood

Estimated building losses for the coastal flood hazard generated by Hazus-MH are broken down into two categories: direct building losses and business interruption losses. The direct building losses are the estimated costs to repair or replace the damage caused to the building and its contents. The business interruption losses are the losses associated with the inability to operate a business because of the damage sustained during the flood. Business interruption losses also include the temporary living expenses for those people displaced from their homes because of the flood (see **Table 4-145**).

Table 4-145 Coastal Flood Loss Estimates (100-year Event) - North Haven
Millions of Dollars

	Residential	Commercial	Industrial	Others	Total
Direct Building Loss					
Building	$0.02	$1.83	$2.41	$0.02	$4.28
Contents	$0.01	$4.45	$5.78	$0.18	$10.41
Inventory	$0.00	$0.15	$0.92	$0.00	$1.07
Subtotal	**$0.03**	**$6.43**	**$9.11**	**$0.20**	**$15.77**
Business Interruption					
Income	$0.00	$0.01	$0.00	$0.00	$0.01
Relocation	$0.00	$0.00	$0.00	$0.00	$0.00
Rental Income	$0.00	$0.00	$0.00	$0.00	$0.00
Wage	$0.00	$0.01	$0.00	$0.00	$0.01
Subtotal	**$0.00**	**$0.03**	**$0.00**	**$0.00**	**$0.03**
TOTAL	**$0.03**	**$6.45**	**$9.11**	**$0.20**	**$15.80**

In addition, the Hazus-MH model estimates one households will be displaced due to the flood. Displacement includes households evacuated from within or very near to the inundated area. Of these, zero people will seek temporary shelter in public shelters.

In the previous Plan none of North Haven's flood zones were defined as coastal. Taking both coastal and inland flood loss estimates together ($58.74 million), flood loss estimates are similar to those of the previous Plan ($66.32 million). The remaining difference is most likely explained by incremental improvements in the Hazus-MH program over the last few years.

Hurricane Wind

Hazus-MH was used to model probabilistic hurricane wind impacts for the 10-, 20-, 50-, 100-, 200-, 500- and 1,000-year events. These annualized return periods compare to the Saffir-Simpson Scale in the following way:

- 10-year Tropical Depression/Tropical Storm
- 20-year Tropical Storm

- 50-year Tropical Storm/Category 1
- 100-year Category 1/Category 2
- 200-year Category 2
- 500-year Category 3
- 1000-year Category 3

The number of buildings estimated to be damaged and the resulting building-related economic losses are shown in **Table 4-146, Table 4-147,** and **Table 4-148.**

Table 4-146 Number of Buildings Damaged - North Haven

	Return Period	Minor	Moderate	Severe	Destruction	Total
2014 Results	10-year	0	0	0	0	0
	20-year	6	0	0	0	6
	50-year	149	8	0	0	157
	100-year	814	82	3	1	900
	200-year	1,912	364	29	16	2,321
	500-year	3,192	1,186	233	137	4,748
	1,000-year	3,480	2,006	676	438	6,600
2017 Results	10-year	0	0	0	0	0
	20-year	5	0	0	0	5
	50-year	44	2	0	0	46
	100-year	271	21	0	0	292
	200-year	788	91	3	1	883
	500-year	1,738	334	24	11	2,107
	1,000-year	2,545	710	85	44	3,384

Table 4-147 Building-Related Economic Losses - North Haven

	Return Period	Minor	Moderate	Severe	Destruction	Total
2014 Results	10-year	$0	$0	$0	$0	$0
	20-year	$427,700	$0	$0	$0	$427,700
	50-year	$6,437,960	$309,670	$88,010	$26,970	$6,862,610
	100-year	$18,452,030	$2,481,380	$820,430	$323,580	$22,077,420
	200-year	$47,594,050	$8,965,620	$4,036,600	$1,164,830	$61,761,100
	500-year	$166,376,220	$35,554,650	$18,099,890	$3,779,390	$223,810,150
	1,000-year	$374,734,160	$93,197,840	$43,642,420	$8,807,250	$520,381,670
2017 Results	10-year	$0	$0	$0	$0	$0
	20-year	$159,310	$0	$0	$0	$159,310
	50-year	$5,847,690	$148,310	$34,020	$13,770	$6,043,780
	100-year	$16,692,500	$721,900	$234,800	$69,680	$17,718,870
	200-year	$32,828,220	$2,804,810	$1,063,840	$338,190	$37,035,050
	500-year	$72,155,280	$10,421,690	$4,733,650	$1,346,690	$88,657,310
	1,000-year	$140,178,620	$23,242,530	$11,889,700	$2,844,220	$178,155,070

Table 4-148 Other Hurricane Impacts – North Haven

Return Period	Debris Generated (Tons)	Households Displaced	Individuals Seeking Temporary Shelter
10-year	0	0	0
20-year	1	0	0
50-year	1,814	0	0
100-year	6,510	1	0
200-year	12,659	15	4
500-year	23,058	53	10
1,000-year	36,170	156	25

Other modeled impacts of this event include the following effects on essential facilities:

- After a 500-year hurricane, all 10 schools are expected to lose at least one day of use
- After a 1,000-year hurricane, all 10 schools are expected to lose at least one day of use

These hurricane wind results show a decrease in the loss estimates from high wind events between previous and current Hazus-MH results. The difference in results is most likely explained by incremental improvements in the Hazus-MH program over the last few years.

Earthquake

An earthquake scenario was developed using Hazus-MH that models a magnitude 6.4 earthquake with an epicenter 10 kilometers below East Haddam. The number of buildings estimated to be damaged and the resulting building-related economic losses are shown in **Table 4-149** and **Table 4-150.**

Table 4-149 Number of Buildings Damaged - North Haven

	Slight	Moderate	Extensive	Complete	Total
Count	1,982	857	258	76	3,173

Table 4-150 Building-Related Economic Losses - North Haven

	Residential	Commercial	Industrial	Others	Total
Losses	$95,460,000	$181,520,000	$61,310,000	$14,690,000	$352,980,000

Other modeled impacts of this event include:

- Essential Facilities:
  - No essential facilities experience at least moderate damage
  - Following the event, the functionality of essential facilities is as follows:
    - Schools: zero of ten are more than 50% functional the day after the event
    - Fire Stations: zero of four are more than 50% functional the day after the event
- Transportation Infrastructure:
  - Only 64 of 71 highway segments are more than 50% functional after one week
  - 7 highway bridge experiences at least moderate damage; 58 of 64 are more than 50% functional after one day, all 64 are functional after a week
  - Total highway system losses are $88.32 million

  - All 51 railway segments, and the one railway facility, remain functional; total losses are $390,000
  - Zero of one light rail segments are more than 50% functional after one week
  - The one bus facility remains functional; total losses are $180,000
- Utilities:
  - Potable water pipelines: 99 leaks and 25 breaks. Total water system losses are $440,000
  - The waste water system is less than 50% functional after day one, but resumes functionality by one week; wastewater pipelines experience 71 leaks and 18 breaks; total waste water system losses are $6.06 million
  - Natural gas pipelines: 20 leaks and 5 breaks, a loss of $90,000
  - No loss of potable water or electric service
- Shelter: 138 household will be displaced, with 73 individuals seeking temporary shelter in public shelters
- 6 to 31 individuals may require hospitalization and 1 to 7 individuals may be killed, depending on the time of day the earthquake strikes

ANNUALIZED LOSS ESTIMATES

Table 4-151 shows annualized loss estimates (ALE) for each hazard. Estimates were derived from a number of sources, as described in the Methodology section, and included in column two of the table:

- NFIP: Historic flood insurance claims processed for the community
- PA: Historic Public Assistance grants awarded to the community
- State HMP: Localized estimates based on those presented in the 2014 Connecticut Hazard Mitigation Plan
- HAZUS: Hazus-MH results from modeling performed for this multi-jurisdictional plan
- State HAZUS: Hazus-MH results from modeling performed for the 2014 Connecticut Hazard Mitigation Plan

Hazus-MH results for flooding and earthquake hazards (as run for this multi-jurisdictional plan) were not able to be annualized, and so are not included in the table below.

Table 4-151 Annualized Loss Estimates by Hazard – North Haven

Hazard	Source	2018 HMP ALE
Flooding	NFIP	$39,713
	PA	$11,735
	State HMP	$5,547
Hurricane Wind Thunderstorm	HAZUS	$852,827
	PA	$5,868
	State HMP	$2,263
Tornado Winter Storm Dam Failure	State HMP	$236,184
	PA	$55,748
	State HMP	$175
	State HMP	$962
Wildfire	State HMP	$12,437
Earthquake	State HAZUS	$45,535

PROBLEM STATEMENTS—NORTH HAVEN

Table 4-152 provides statements of particular interest with regard to primary hazards of concern, geographic areas of concern, and vulnerable community assets within the Town of North Haven. If applicable, any noted potential solutions or mitigation actions are discussed with the problem statements.

Table 4-152 Problem Statements - North Haven

Primary Hazards of Concern	
Trees	Power outages caused by hurricane/tropical storms and severe winter storms are major local issue. The Town fields many calls from residents that need to go to United Illuminating Co.
Inland/Riverine Flooding	Inland/riverine flooding is greatest concern, especially along Muddy River, and along tidal influenced Quinnipiac River.
Urban Flooding	Urban flooding is a significant concern in isolated areas due to undersized stormwater drainage systems as well as debris/blockages.
Geographic Areas of Concern	
Muddy River	**Muddy River** – many areas/roads along river are impacted by flooding following heavy rain events, mostly attributed to sediment build up in channel, along with downed trees, beaver dams, etc. (unable to remove due to CT DEEP permitting process). Specific areas of concern are listed separately below. Potential solutions/mitigation actions: • Focus on older development, as new construction is already not allowed in proximity to the river. • Continue to coordinate with Town of Wallingford on upstream dredging and flood control (Town-owned dams/ reservoir). • Continue to examine ways to dredge/remove sediment build up in known problem areas.
Route 103 (Quinnipiac Avenue) @ Muddy River	**Route 103 (Quinnipiac Avenue) @ Muddy River** (near intersection with railroad) – Specific areas of concern in proximity include:
Old Maple Avenue	**Old Maple Avenue** – very frequent flooding occurrences for commercial properties along Muddy River. On average this area floods twice per year, with as much as 2 feet of water (threatens mechanical equipment). Have used Duck Bills as back flow preventers.
Pine River Road	**Pine River Road** – frequent flooding concerns for residential properties south of the Muddy River (floods homes and in-ground pools). Town receives many calls from residents for even 2-3" rain/snow events.
Potter Road / Ansonia Drive	**Potter Road / Ansonia Drive** – residential area south of Muddy River. Historical flooding issues, though much has been abated through recent upstream dredging and sediment control in Wallingford.
Sheffield Drive	**Sheffield Drive** – residences on east side of street are prone to flooding from the Muddy River.
Bishop Drive @ State Street	**Bishop Drive @ State Street** – flooding concerns from Quinnipiac River (4 feet of flood water on roadway during 1992 event).
Patten Road	**Patten Road** – roadway flooding from Muddy River. Possible threat to approx. 5 new lots/homes in the area, especially if upstream reservoir is full combined with heavy rains.
Spring Road @ Fitch Street	**Spring Road @ Fitch Street** – flooding concerns from Five Mile Brook (tributary to Muddy River). Roadway and several residential properties along the brook are at risk, though to date only experienced yard flooding.
Spring Road @ Potter Road	**Spring Road @ Potter Road –** flooding concerns from Muddy River (roadway and several residential properties).
Timothy Drive	**Timothy Drive** – stormwater/urban flooding concerns for residential area, with history of some damage to homes.
Sacket Point Road, Margo Circle, and Old Broadway Street	**Sacket Point Road, Margo Circle, and Old Broadway Street** – these distinct areas have historically been impacted by past sewer backups/overflows and blown manhole covers.
Catch Basins	More than 2,200 catch basins across town that can't be cleaned out with Town's

	limited resources alone. Now have a program in place to clean 500 catch basins a year, must do this for MS4 compliance. Removing the sand is making a big difference. Some areas are impossible to access because they are in the woods. Potential solutions/mitigation actions: contract for outside assistance with cleaning drainage structures.
Sanitary Sewers	Many sanitary sewers are in isolated wooded areas throughout town, including private property, but not all infiltration sources are inventoried or mapped (in addition to miles of underground sewer lines).
Pool Road near Temple Street	Pool Road near Temple Street – flooding is an issue here despite the large pipe and grates recently installed.
Elm Road/Stoddard Road	Elm Road/Stoddard Road – flooding issue.
Whitney Ridge Area	Whitney Ridge area (west side of town, between Whitney Avenue and Ridge Road) – residential area with stormwater/urban flooding concern near junction of multiple storm drains, exacerbated by undersized drainage system and debris accumulation (leaves, sediment, etc.).
Vulnerable Community Assets	
Pump stations	Pump stations – many are susceptible to power failure due to lack of permanent backup generator power.
Facilities near dams	3 critical facilities are within proximity to a significant hazard dam. Further study is necessary to determine if a dam failure could potentially impact these facilities.

CHANGES SINCE 2014

Previously Todd Drive had flooding concerns from Quinnipiac River (residential properties) when water crosses Route 15, boats were used to evacuate residents during past events. A 60" pipe was installed that mitigated the problem.

ORANGE

CRITICAL FACILITIES – ORANGE

Table 4-153 contains a list of critical facilities provided by the Town of Orange. These are depicted on Figure 4-75 along with FEMA flood zones.

Table 4-153 Critical Facilities – Orange

Facility	Location	Emergency Power Supply?	Shelter?	In Floodplain or Coastal Flood Hazard Area?	In Surge Zones?
Police Station	314 Lambert Road	N/A	EOC Center	No	No
Fire House #1	625 Orange Center Road	N/A	No	No	No
Fire House #2	355 Boston Post Road	N/A	No	No	No
Town Hall	617 Orange Center Road	Yes	N/A	N/A	N/A
Public Works	308 Lambert Road	N/A	N/A	N/A	N/A
High Plains Community Center	525 Orange Center Road	Yes	Yes	N/A	N/A

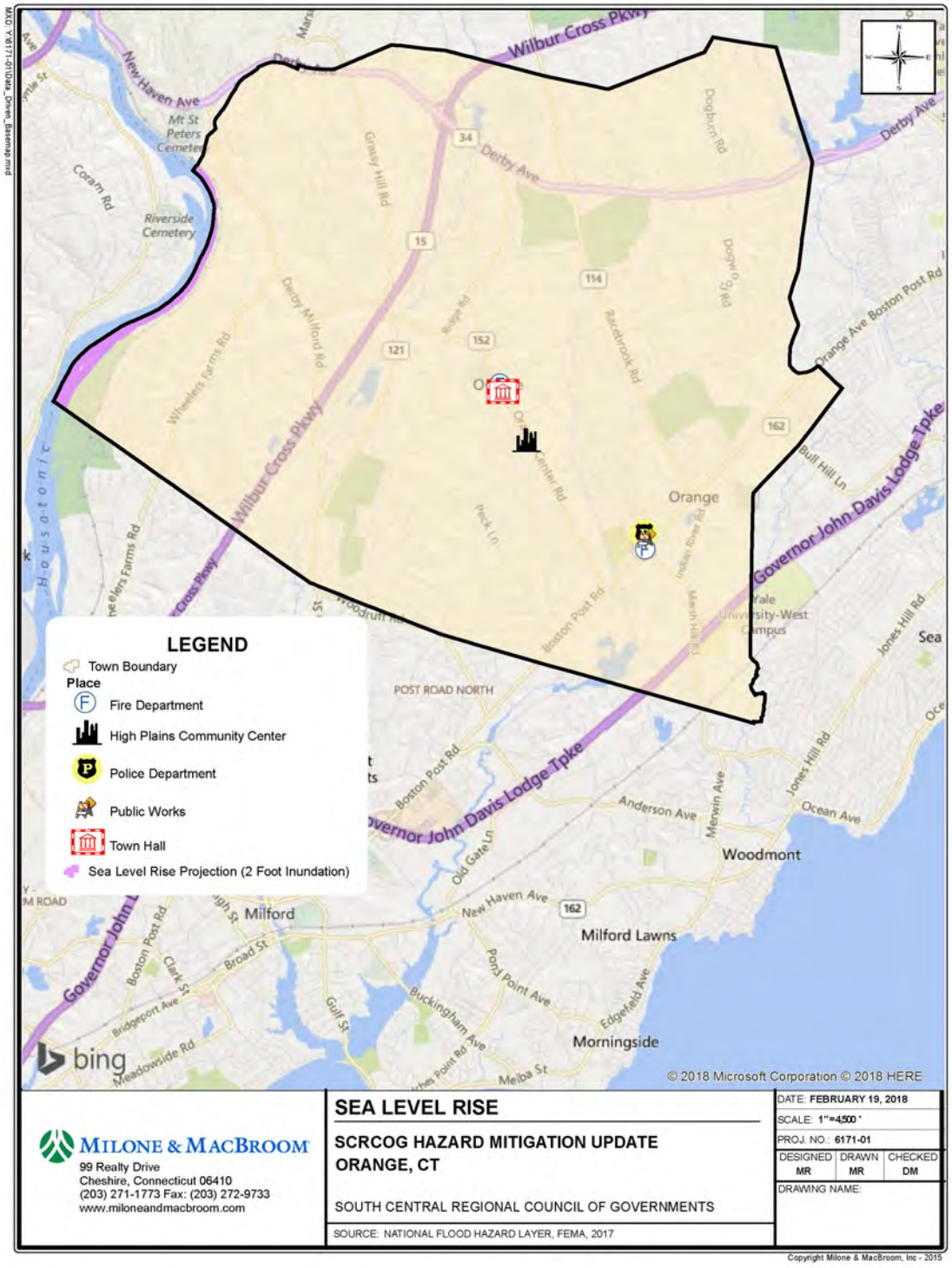


Figure 4-75 Critical Facilities and SFHA Map - Orange

VULNERABLE ASSETS—ORANGE

Vulnerable assets were identified by intersecting GIS-based asset inventories and demographic data with known hazard boundaries to determine the number of parcels, buildings, critical facilities, historic assets, and populations exposed to each hazard. This results in an estimation of vulnerable assets by hazard as shown in **Table 4-154.** Figure 4-76 depicts the locations of historic resources.

Table 4-154 Vulnerable Assets by Hazard - Orange

Hazard	Number of Parcels[335]	Number of Buildings[336]	Critical Facilities[337]	Historic Assets[338]	Population[339]
Extreme Temperatures	6,061	5,959	6	69	2,666
Hurricane/Tropical Storm	6,061	5,959	6	69	13,956
Severe Thunderstorm	6,061	5,959	6	69	13,956
Severe Winter Storm/Nor'easter	6,061	5,959	6	69	13,956
Tornado	6,061	5,959	6	69	13,956
Dam Failure					
High Hazard (Class C)	16	0	0	0	0
Significant Hazard[340] (Class B)	N/A	N/A	N/A	N/A	N/A
Drought	6,061	5,959	6	69	13,956
Flood[341]					
1-Percent-Annual-Chance	585	116	0	0	303
0.2-Percent-Annual-Chance	664	112	0	0	292
Zone VE	26	0	0	0	0
Category 1 Storm Surge	88	0	0	0	0
Category 2 Storm Surge	88	0	0	0	0
Category 3 Storm Surge	88	2	0	0	5
Category 4 Storm Surge	10	2	0	0	5
Sea Level Rise	6,061	5,959	6	69	13,956
Earthquake	2,384	1,236	0	0	3,226
Wildfire	585	116	0	0	303

[335] Based on data provided by the Town of Branford.
[336] Based on building numbers from 2010 census data.
[337] Based on data provided by the Town of Branford.
[338] Based on data provided by the Town of Branford.
[339] Based on population numbers from 2010 census data.
[340] Dam failure inundation mapping was available for Class C dams. Inundation mapping was not available for other dams located in the town.
[341] Results for the flood hazard are not cumulative. Numbers and values of assets for events of increasing magnitude should be read as "in addition to" the preceding magnitudes.

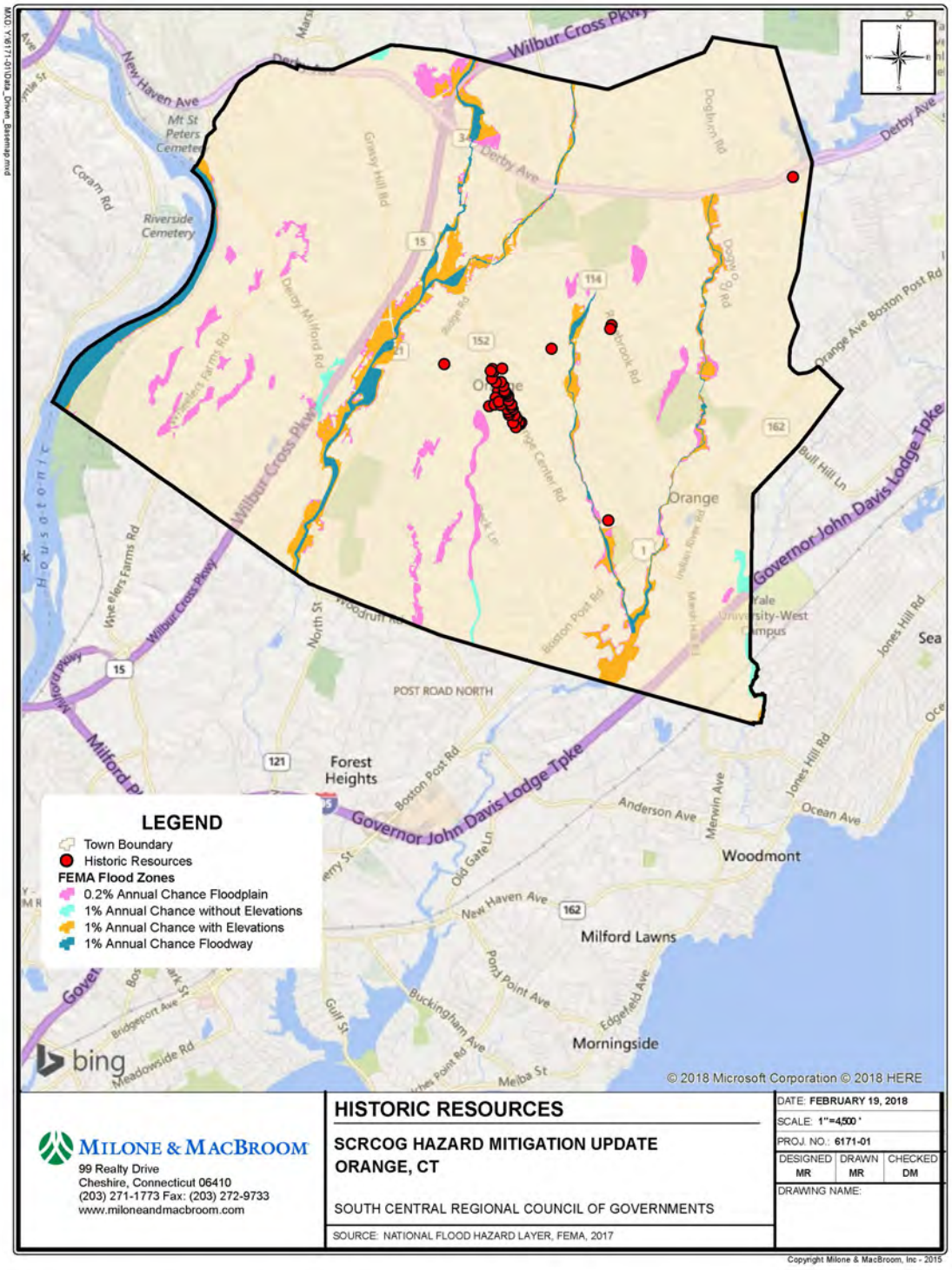


Figure 4-76 Historic Resources Map - Orange

REPETITIVE LOSS AND SEVERE REPETITIVE LOSS PROPERTIES

In addition to the spatial analysis conducted above, summary information for repetitive flood loss and severe repetitive flood loss properties within the Town of Orange also provides an indication of vulnerable assets, especially with regard to properties insured under the National Flood Insurance Program that have experienced repeated flooding (see Table 4-155).[342]

Table 4-155 Repetitive Flood Loss and Severe Repetitive Flood Loss Summary - Orange

	Number of Losses	Number of Properties	Building Payments	Contents Payments	Total Payments
Repetitive Loss	55	15	$380,818	$227,804	$608,622
Severe Repetitive Loss	11	2	$162,238	$77,243	$239,481

The majority of the RL properties are single-family homes. Only one RL property is non-residential, and it appears to be a retail store.

As of December 31, 2012, the Town of Orange had a total of 131 claims totaling $1,244,981 in losses for all NFIP-insured structures. By July 31, 2017, that number had grown to 133 claims totaling $1,262,028.

Figure 4-77 through Figure 4-80 show dams, hurricane surge, sea level rise, and wildfire hazard areas within the Town of Orange.

[342] Based on information provided by the Federal Emergency Management Agency current as of 12/31/2012.

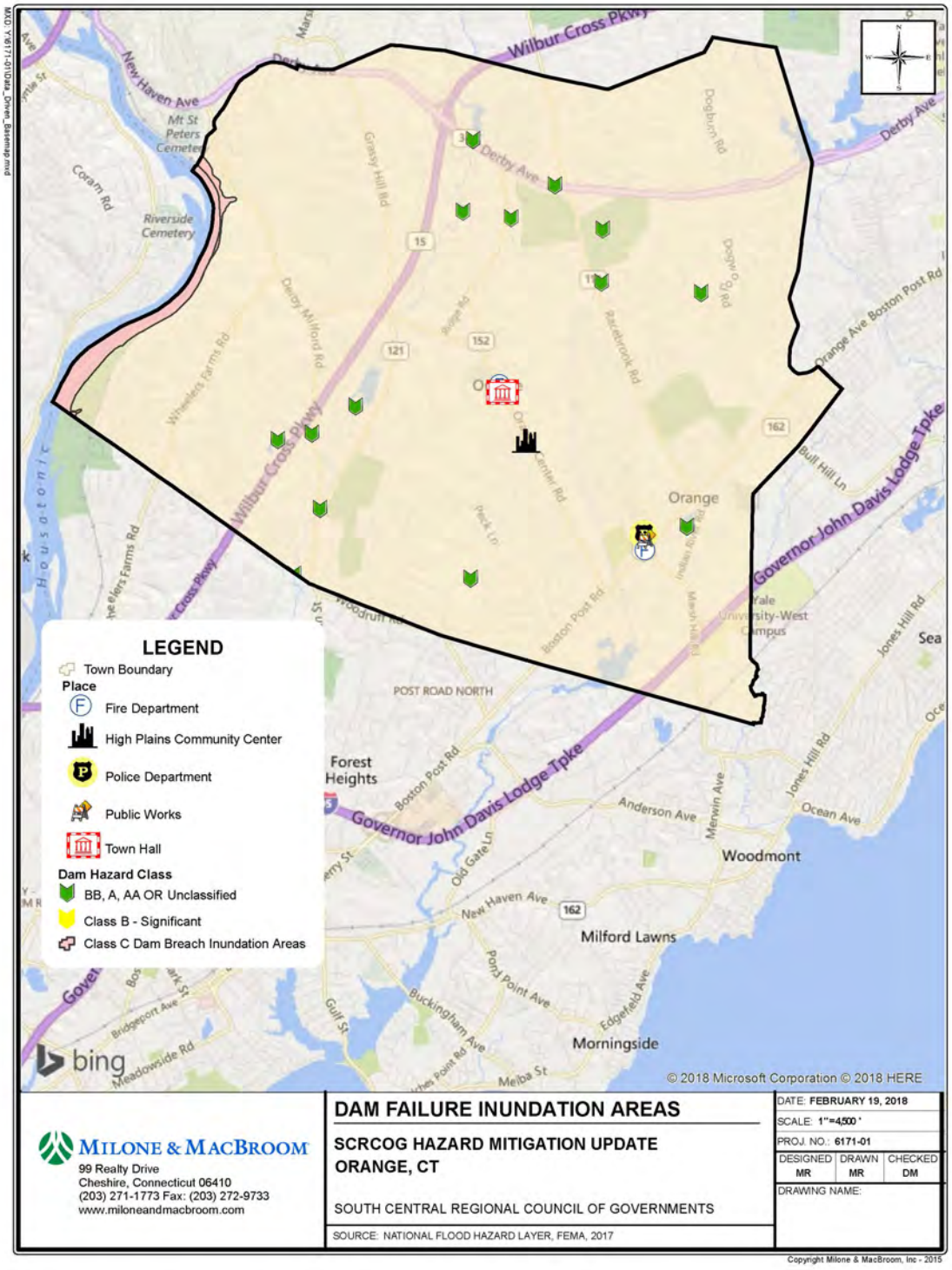


Figure 4-77 Dams Map - Orange

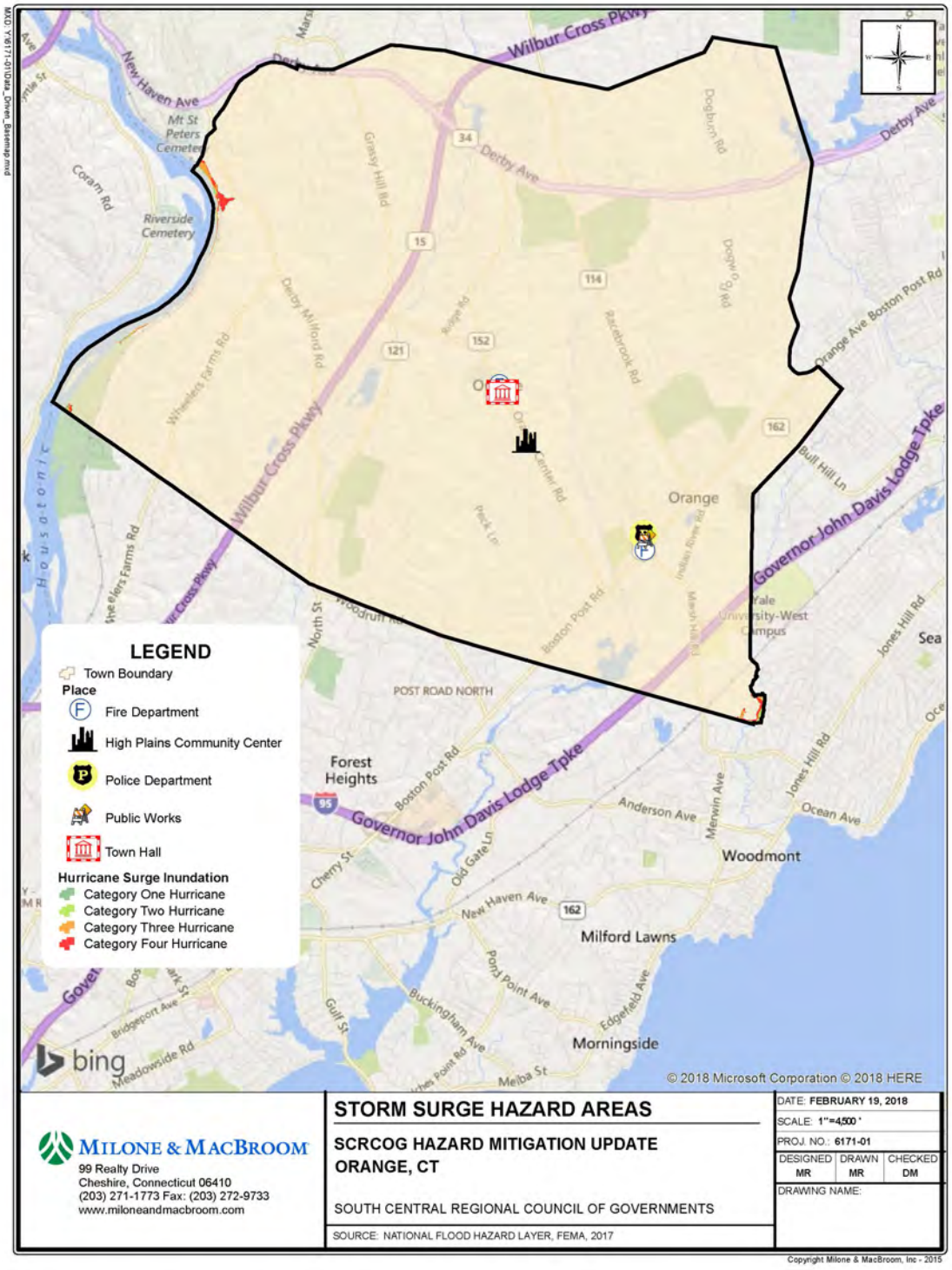


Figure 4-78 Hurricane Inundation Map - Orange

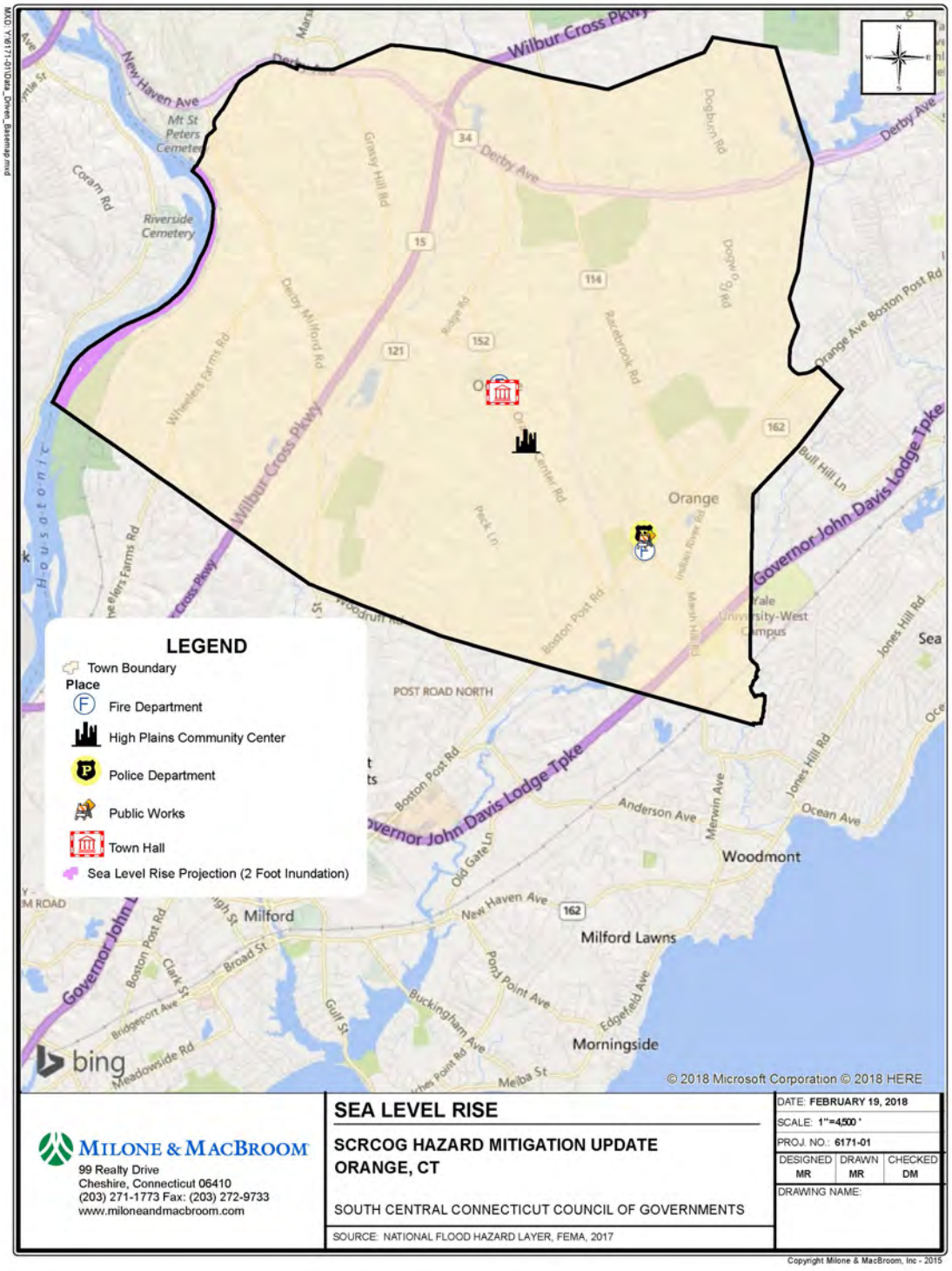


Figure 4-79 Sea Level Rise Map – Orange

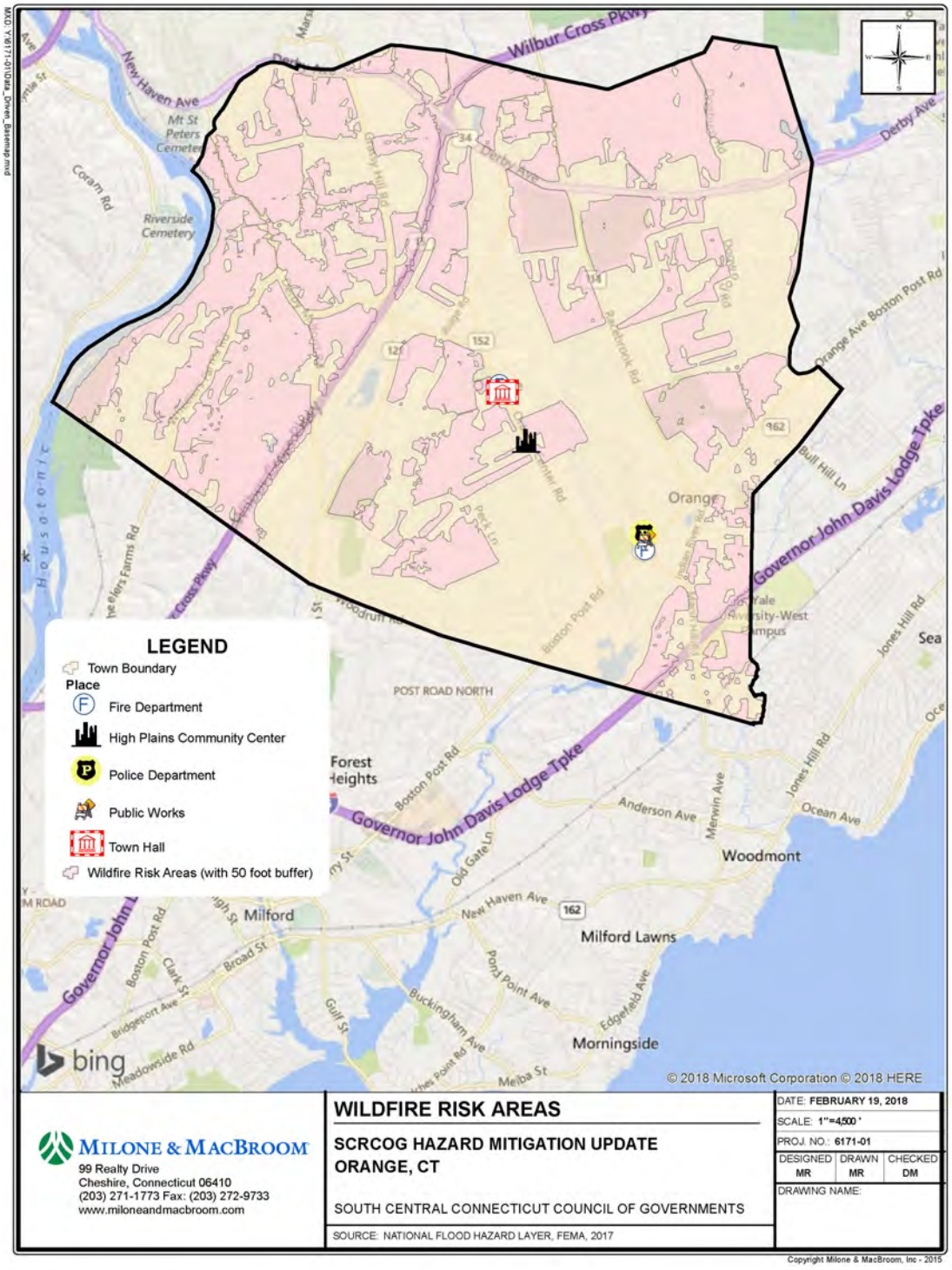


Figure 4-80 Wildfire Map - Orange

POTENTIAL IMPACTS—ORANGE

Table 4-156 shows the total estimated value of improved parcels (parcels that contain at least one building), critical facilities, and historic assets that intersect with known hazard areas, as an indicator of the potential impacts should a hazard event occur.

Table 4-156 Potential Impacts by Hazard - Orange[343]

Hazard	Value of At-Risk Parcels[344]	Value of At-Risk Critical Facilities[345]	Value of At-Risk Historic Assets[346]
Extreme Temperatures	$1,996,615,910	$21,867,500	$14,070,840
Hurricane/Tropical Storm	$1,996,615,910	$21,867,500	$14,070,840
Severe Thunderstorm	$1,996,615,910	$21,867,500	$14,070,840
Severe Winter Storm/Nor'easter	$1,996,615,910	$21,867,500	$14,070,840
Tornado	$1,996,615,910	$21,867,500	$14,070,840
Dam Failure			
High Hazard (Class C)	$3,107,250	$0	N/A
Significant Hazard[347] (Class B)	N/A	N/A	N/A
Drought	$1,996,615,910	$21,867,500	$14,070,840
Flood[348][349]			
1-Percent-Annual-Chance	$169,047,845	$15,873,400	$0
0.2-Percent-Annual-Chance	$161,179,457	$15,873,400	$296,100
Zone VE	$953,083	$0	$0
Category 1 Storm Surge	$6,266,050	$0	$0
Category 2 Storm Surge	$9,414,350	$0	$0
Category 3 Storm Surge	$9,736,050	$0	$0
Category 4 Storm Surge	$1,020,950	$0	$0
Sea Level Rise	$1,996,615,910	$21,867,500	$14,070,840
Earthquake	$507,773,031	$7,079,000	$5,349,500
Wildfire	$169,047,845	$15,873,400	$0

[343] Potential Impacts are based on parcel exposure, not building exposure. It is possible for a historic asset or critical facility building to not be exposed, yet its associated parcel intersects a hazard area. The parcel value will then be reflected in the Potential Impacts Table.
[344] Based on data provided by the Town of Branford.
[345] Based on data provided by the Town of Branford.
[346] Based on data provided by the Town of Branford.
[347] Dam failure inundation mapping was available for Class C dams. Inundation mapping was not available for other dams located in the town.
[348] Results for the flood hazard are not cumulative. Numbers and values of assets for events of increasing magnitude should be read as "in addition to" the preceding magnitudes.
[349] Results for the hurricane inundation areas are cumulative. Numbers and values of assets for events of increasing magnitude should be read as "consisting of" the preceding magnitudes.

LOSS ESTIMATES—ORANGE

DETAILED HAZUS-MH LOSS ESTIMATES

Riverine Flood

Estimated building losses for the riverine flood hazard generated by Hazus-MH are broken down into two categories: direct building losses and business interruption losses. The direct building losses are the estimated costs to repair or replace the damage caused to the building and its contents. The business interruption losses are the losses associated with the inability to operate a business because of the damage sustained during the flood. Business interruption losses also include the temporary living expenses for those people displaced from their homes because of the flood (see Table 4-157).

Table 4-157 Riverine Flood Loss Estimates (1-Percent-Annual-Chance Flood) - Orange

	2014 Results Millions of Dollars					2017 Results Millions of Dollars				
	Residential	Commercial	Industrial	Others	Total	Residential	Commercial	Industrial	Others	Total
Direct Building Loss										
Building	$3.74	$1.65	$1.04	$0.09	$6.52	$4.56	$1.70	$0.26	$0.11	$6.63
Contents	$2.06	$4.82	$2.83	$0.62	$10.33	$2.00	$5.75	$0.61	$0.65	$9.02
Inventory	$0	$0.12	$0.33	$0	$0.45	$0.00	$0.13	$0.06	$0.00	$0.19
Subtotal	**$5.80**	**$6.59**	**$4.20**	**$0.71**	**$17.30**	**$6.57**	**$7.58**	**$0.94**	**$0.77**	**$15.84**
Business Interruption										
Income	$0	$0.01	$0	$0	$0.01	$0.00	$0.01	$0.00	$0.00	$0.01
Relocation	$0	$0	$0	$0	$0	$0.00	$0.00	$0.00	$0.00	$0.00
Rental Income	$0	$0	$0	$0	$0	$0.00	$0.00	$0.00	$0.00	$0.00
Wage	$0	$0.02	$0	$0.05	$0.07	$0.00	$0.02	$0.00	$0.05	$0.07
Subtotal	**$0**	**$0.03**	**$0**	**$0.05**	**$0.08**	**$0.00**	**$0.04**	**$0.00**	**$0.05**	**$0.09**
TOTAL	**$5.80**	**$6.62**	**$4.20**	**$0.76**	**$17.38**	**$6.57**	**$7.61**	**$0.94**	**$0.82**	**$15.93**

In addition, the Hazus-MH model estimates 113 households will be displaced due to the flood. Displacement includes households evacuated from within or very near to the inundated area. Of these, 117 people will seek temporary shelter in public shelters.

These inland flooding results show a minor decrease in the loss estimates from a 1% annual chance flood event between previous and current Hazus-MH results. The difference in results is most likely explained by incremental improvements in the Hazus-MH program over the last few years.

Hurricane Wind

Hazus-MH was used to model probabilistic hurricane wind impacts for the 10-, 20-, 50-, 100-, 200-, 500- and 1,000-year events. These annualized return periods compare to the Saffir-Simpson Scale in the following way:

- 10-year Tropical Depression/Tropical Storm
- 20-year Tropical Storm
- 50-year Tropical Storm/Category 1
- 100-year Category 1/Category 2
- 200-year Category 2
- 500-year Category 3
- 1000-year Category 3

The number of buildings estimated to be damaged and the resulting building-related economic losses are shown in **Table 4-158, Table 4-159,** and **Table 4-160.**

Table 4-158 Number of Buildings Damaged - Orange

	Return Period	Minor	Moderate	Severe	Destruction	Total
2014 Results	10-year	0	0	0	0	0
	20-year	3	0	0	0	3
	50-year	60	2	0	0	62
	100-year	398	32	1	0	431
	200-year	976	155	11	5	1,147
	500-year	1,845	595	101	55	2,596
	1,000-year	2,142	1,070	315	187	3,714
2017 Results	10-year	0	0	0	0	0
	20-year	2	0	0	0	2
	50-year	19	1	0	0	20
	100-year	125	9	0	0	131
	200-year	380	37	1	0	418
	500-year	944	160	10	4	1,118
	1,000-year	1,420	353	38	17	1,828

Table 4-159 Building-Related Economic Losses – Orange

	Return Period	Minor	Moderate	Severe	Destruction	Total
2014 Results	10-year	$0	$0	$0	$0	$0
	20-year	$16,550,000	$0	$0	$0	$16,550,000
	50-year	$2,042,490	$134,530	$23,250	$11,550	$2,211,820
	100-year	$6,708,700	$1,180,440	$220,800	$115,670	$8,225,610
	200-year	$17,923,370	$5,357,370	$1,180,650	$719,240	$25,180,630
	500-year	$72,235,770	$20,427,860	$5,382,790	$2,043,970	$100,090,390
	1,000-year	$170,867,410	$56,074,780	$13,782,830	$4,668,310	$245,393,330
2017 Results	10-year	$0	$0	$0	$0	$0
	20-year	$60	$0	$0	$0	$60
	50-year	$1,331,530	$96,910	$14,060	$7,690	$1,450,190
	100-year	$5,308,320	$489,590	$88,350	$34,090	$5,920,340
	200-year	$10,767,640	$1,684,430	$325,680	$162,280	$12,940,030
	500-year	$27,545,580	$7,021,000	$1,584,980	$870,210	$37,021,770
	1,000-year	$58,594,200	$16,660,260	$4,281,140	$1,801,850	$81,337,450

Table 4-160 Other Hurricane Impacts - Orange

Return Period	Debris Generated (Tons)	Households Displaced	Individuals Seeking Temporary Shelter
10-year	0	0	0
20-year	0	0	0
50-year	102	0	0
100-year	3,657	0	0
200-year	6,506	2	0
500-year	12,263	14	2
1,000-year	22,585	43	9

Other modeled impacts of this event include the following effects on essential facilities:

- After a 500-year hurricane, 2 of 8 schools are expected to lose at least one day of use
- After a 1,000-year hurricane, all 8 schools are expected to lose at least one day of use

These hurricane wind results show a decrease in the loss estimates from high wind events between previous and current Hazus-MH results. The difference in results is most likely explained by incremental improvements in the Hazus-MH program over the last few years.

Earthquake

An earthquake scenario was developed using Hazus-MH that models a magnitude 6.4 earthquake with an epicenter 10 kilometers below East Haddam. The number of buildings estimated to be damaged and the resulting building-related economic losses are shown in **Table 4-161** and **Table 4-162.**

Table 4-161 Table 4.152 Number of Buildings Damaged – Orange

	Slight	Moderate	Extensive	Complete	Total
Count	735	249	44	6	1,034

Table 4-162 Building-Related Economic Losses - Orange

	Residential	Commercial	Industrial	Others	Total
Losses	$21,340,000	$36,190,000	$6,100,000	$2,730,000	$66,370,000

Other modeled impacts of this event include:

- Essential Facilities:
  - No essential facilities experience a
  - No essential facilities lose more than 50% functionality
- Transportation Infrastructure:
  - Only 38 of 43 highway segments are more than 50% functional after one week, total losses are $3.77 million
  - 9 of 11 light rail segments are more than 50% functional after one week
- Utilities:
  - Potable water pipelines: 34 leaks and 8 breaks. Total water system losses are $150,000
  - Wastewater pipelines: 24 leaks and 6 breaks, a loss of $110,000
  - Natural gas pipelines: 7 leaks and 2 breaks, a loss of $30,000

  - No loss of water or electric service
- Shelter: 12 households will be displaced, with 6 individuals seeking temporary shelter in public shelters
- 1 to 3 individuals may require hospitalization and 0 to 1 individuals may be killed, depending on the time of day the earthquake strikes

ANNUALIZED LOSS ESTIMATES

Table 4-163 shows annualized loss estimates (ALE) for each hazard. Estimates were derived from a number of sources, as described in the Methodology section, and included in column two of the table:

- NFIP: Historic flood insurance claims processed for the community
- PA: Historic Public Assistance grants awarded to the community
- State HMP: Localized estimates based on those presented in the 2014 Connecticut Hazard Mitigation Plan
- HAZUS: Hazus-MH results from modeling performed for this multi-jurisdictional plan
- State HAZUS: Hazus-MH results from modeling performed for the 2014 Connecticut Hazard Mitigation Plan

Hazus-MH results for flooding and earthquake hazards (as run for this multi-jurisdictional plan) were not able to be annualized, and so are not included in the table below.

Table 4-163 Annualized Loss Estimates by Hazard – Orange

Hazard	Source	Annualized Loss Estimate
Flooding	NFIP	$32,360
	PA	$54,381
	State HMP	$3,213
Hurricane Wind Thunderstorm	HAZUS	$321,219
	PA	$27,191
	State HMP	$1,311
Tornado Winter Storm Dam Failure	State HMP	$136,811
	PA	$49,913
	State HMP	$102
	State HMP	$558
Wildfire	State HMP	$10,284
Earthquake	State HAZUS	$26,377

PROBLEM STATEMENTS—ORANGE

Table 4-164 provides statements of particular interest with regard to primary hazards of concern, geographic areas of concern, and vulnerable community assets within the Town of Orange. If applicable, any noted potential solutions or mitigation actions are discussed with the problem statements.

Table 4-164 Problem Statements – Orange

Primary Hazards of Concern	
Trees	Tree-related hazards identified as #1 hazard related concern for Town. Post-storm issues are widespread during **hurricane/tropical storm** and **severe winter storm** events, particularly downing electrical lines, and when falling and blocking roads. Town has found it difficult to manage removal and storage of vegetative debris following recent events.

	Potential solutions/mitigation actions: brush truck and chipper for Town would help clear vegetative debris and stumps off the roads more quickly (currently no Town-owned equipment in place).
Inland/Riverine Flooding	**Inland/riverine flooding** is most critical hazard of concern, regarding roadways and isolation of residents.
Urban Flooding	**Urban flooding** hazards due to undersized drainage structures as well as debris/blockages.
Geographic Areas of Concern	
	South Greenbrier Drive – flooding concerns from Wepawaug River, just south of Lake Wepawaug Dam/ pump house. Attributed to accumulation of sediment, brush, and other debris at the dam.
	Grassy Hill Road @ Derby Milford Road – flooding concerns believed to be caused by the buildup of sediment, brush, and debris at Clarktown Pond Dam, which is in place for irrigation purposes.
	Potential solutions/mitigation actions: remediation through general cleanup (debris removal and sediment control), but all located on private property (no Town access), so options are limited and must be coordinated with owners – possibly along with possibly CT DEEP and USACE.
	Route 1 (Boston Post Road) – subject to urban/stormwater flooding issues around 190-200 block due to inadequately sized drainage structures, starting near Air National Guard station. Flooding issues occur after nearly every heavy rainfall event, including deposit of large rocks and sediment along roadway.
	Mallard Drive – recurring street flooding along Indian Lake, causing access/isolation issues for up to 30 residential properties in the area. Indian River Dam is located downstream in Milford (privately owned), but noted for cause of flooding along upstream lake areas.
	Lindy Street – flooding concerns along Trout Brook (limited to street flooding, causing access/isolation issues).
	Lambert Road@ Sunset Drive – flooding concerns from Indian River, likely caused by undersized culvert under Lambert Road (old masonry tunnel).
	Surrey Drive – flooding concerns for low-density residential area along Race Brook.
Vulnerable Community Assets	
	Turkey Hill School – no backup power
	Potential solutions/mitigation actions: standby power for antennas /communication upgrades.
	This facility is not a shelter but could possibly be a back-up shelter if it had a generator.
	Cell tower located off Wilbur Cross Parkway @ Old Grassy Hill Road is subject to flooding.
	Potential solutions/mitigation actions: should be addressed through solutions proposed for mitigation of flooding at Old Grassy Hill Road bridge over Wepawaug River.
	1 critical facility is within proximity to a significant hazard dam. Further study is necessary to determine if a dam failure could potentially impact this facility.
	Dam at Indian Lake is privately owned

CHANGES/IMPROVMENTS SINCE 2014

- Culvert replacement fixed the Old Grassy Hill Road frequent flooding issue.
- Brookside Road is no longer a flooding issue.

WALLINGFORD

CRITICAL FACILITIES – WALLINGFORD

Table 4-165 contains a list of critical facilities provided by the Town of Wallingford. These are depicted on Figure 4-81 along with FEMA flood zones.

Table 4-165 Critical Facilities – Wallingford[350]

Facility	Location	Emergency Power Supply?	Shelter?	In Floodplain or Coastal Flood Hazard Area?	In Surge Zones?
Emergency Services					
Emergency Operations Center	135 North Main Street	N/A	N/A	N/A	No
Police Headquarters	135 North Main Street	N/A	N/A	N/A	No
Central Fire HQ	75 Masonic Ave	Yes	N/A	N/A	No
Fire Station #1	95 North Main Street	N/A	N/A	N/A	No
Old Fire Station #4	37 Hall Road	N/A	N/A	N/A	No
Emergency Management Building	143 Hope Hill Road	N/A	N/A	N/A	No
Fire Station #7	864 North Farms Road	N/A	N/A	N/A	No
Fire Station # 8	2 Kondracki Lane	N/A	N/A	N/A	No
Municipal Facilities					
Town Hall	45 South Main Street	N/A	N/A	N/A	No
Public Works Facility	29 Town Farm Road	Yes	N/A	N/A	No
Shelters					
Shelter 1 – Sheehan H.S.	142 Hope Hill Road	N/A	Yes	N/A	No
Shelter 2 – Lyman Hall H.S	70 Pond Hill Road	No	Yes	N/A	No
Shelter 3 – Dag Hammerskjold	106 Pond Hill Road	N/A	Yes	N/A	No
Shelter 4 - Moran	141 Hope Hill Road	N/A	Yes	N/A	No
Health Care and Senior Living Facilities					
Gaylord Hospital	50 Gaylord Farm Road	Yes			No
Masonic Hospital	22 Masonic Avenue	N/A	N/A	N/A	No
Regency House	181 East Main Street	N/A	N/A	N/A	No
Skyview Nursing Home	35 Marc Drive	N/A	N/A	N/A	No
Genesis Health Care	55 Kondracki Lane	N/A	N/A	N/A	No

[350] N/A indicates that data was not provided by the town.

Facility	Location	Emergency Power Supply?	Shelter?	In Floodplain or Coastal Flood Hazard Area?	In Surge Zones?
Silver Pond Apartments	656 Center Street	N/A	N/A	N/A	No
Wallingford Public Housing	Various	Yes	N/A	N/A	No
Water and Wastewater					
Water Treatment Plant	1675 Whirlwind Hill Road	N/A	N/A	N/A	No
Waste Water Treatment	155 John Street	N/A	N/A	N/A	No
Other Infrastructure and Facilities					
Electric Generation	East Street	N/A	N/A	N/A	No
Electric Distribution	Varies	N/A	N/A	N/A	No
Choate	333 Christian Street	Yes	N/A	N/A	No

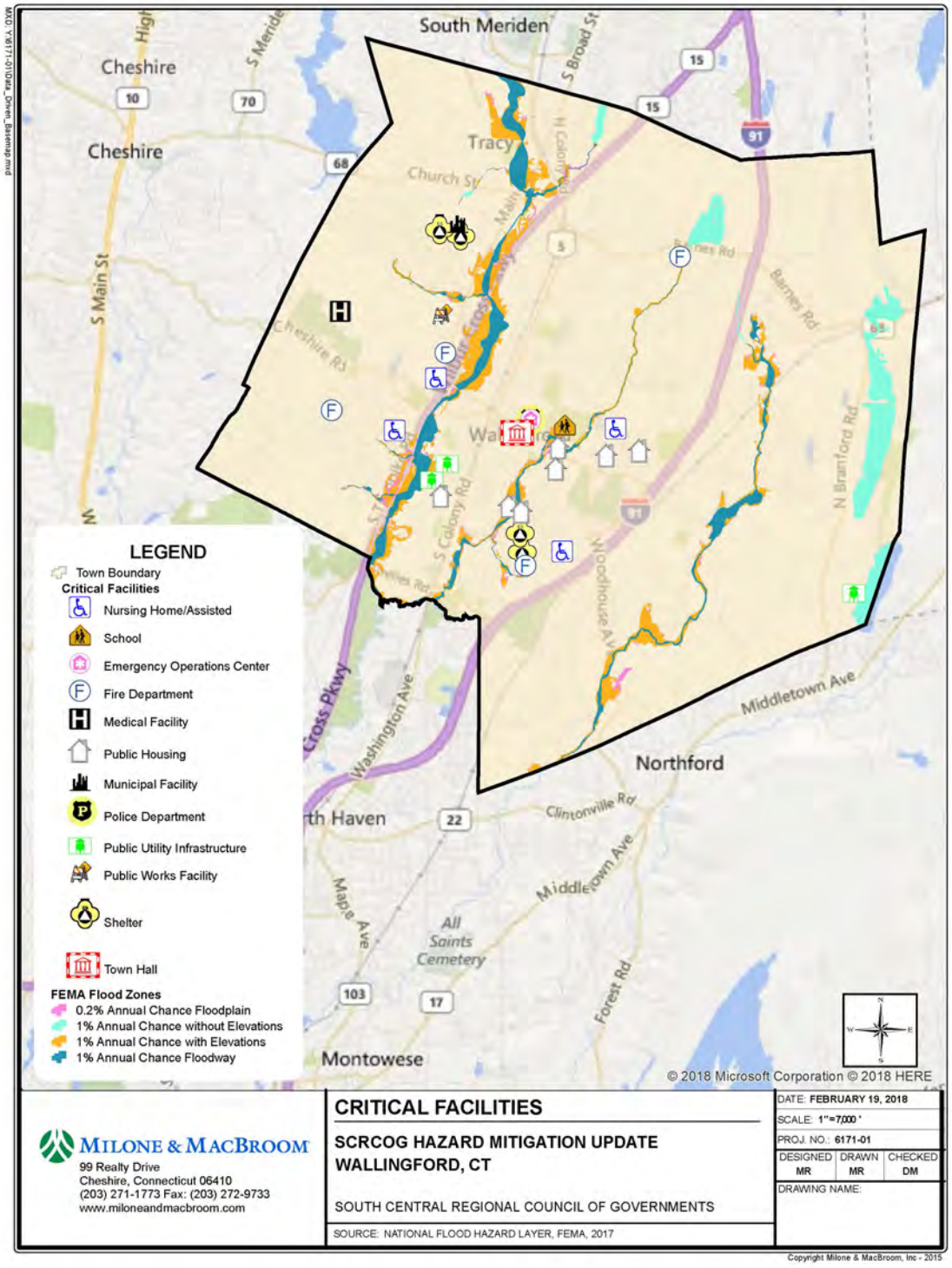


Figure 4-81 Critical Facilities and SFHA Map - Wallingford

VULNERABLE ASSETS—WALLINGFORD

Vulnerable assets were identified by intersecting GIS-based asset inventories and demographic data with known hazard boundaries to determine the number of parcels, buildings, critical facilities, historic assets, and populations exposed to each hazard. This results in an estimation of vulnerable assets by hazard as shown in **Table 4-166.** **Figure 4.69** depicts the locations of historic resources.

Table 4-166 Vulnerable Assets by Hazard - Wallingford

Hazard	Number of Parcels[351]	Number of Buildings[352]	Critical Facilities[353]	Historic Assets[354]	Population[355]
Extreme Temperatures	14,146	18,866	29	127	7,447
Hurricane/Tropical Storm	14,146	18,866	29	127	45,135
Severe Thunderstorm	14,146	18,866	29	127	45,135
Severe Winter Storm/Nor'easter	14,146	18,866	29	127	45,135
Tornado	14,146	18,866	29	127	45,135
Dam Failure					
High Hazard (Class C)	382	525	0	0	1,249
Significant Hazard[356] (Class B)	N/A	N/A	N/A	N/A	N/A
Drought	14,146	18,866	29	127	45,135
Flood[357]					
1-Percent-Annual-Chance	854	334	1	0	795
0.2-Percent-Annual-Chance	389	115	1	0	274
Zone VE	0	0	0	0	0
Category 1 Storm Surge	0	0	0	0	0
Category 2 Storm Surge	1	0	0	0	0
Category 3 Storm Surge	3	0	1	0	0
Category 4 Storm Surge	14,146	18,866	29	127	45,135
Sea Level Rise	6,028	6,702	3	4	15,951
Earthquake	854	334	1	0	795
Wildfire	389	115	1	0	274

[351] Based on data provided by the Town of Branford.
[352] Based on building numbers from 2010 census data.
[353] Based on data provided by the Town of Branford.
[354] Based on data provided by the Town of Branford.
[355] Based on population numbers from 2010 census data.
[356] Class B Dam Inundation Areas are not available for the SCROG area.
[357] Results for the flood hazard are not cumulative. Numbers and values of assets for events of increasing magnitude should be read as "in addition to" the preceding magnitudes.

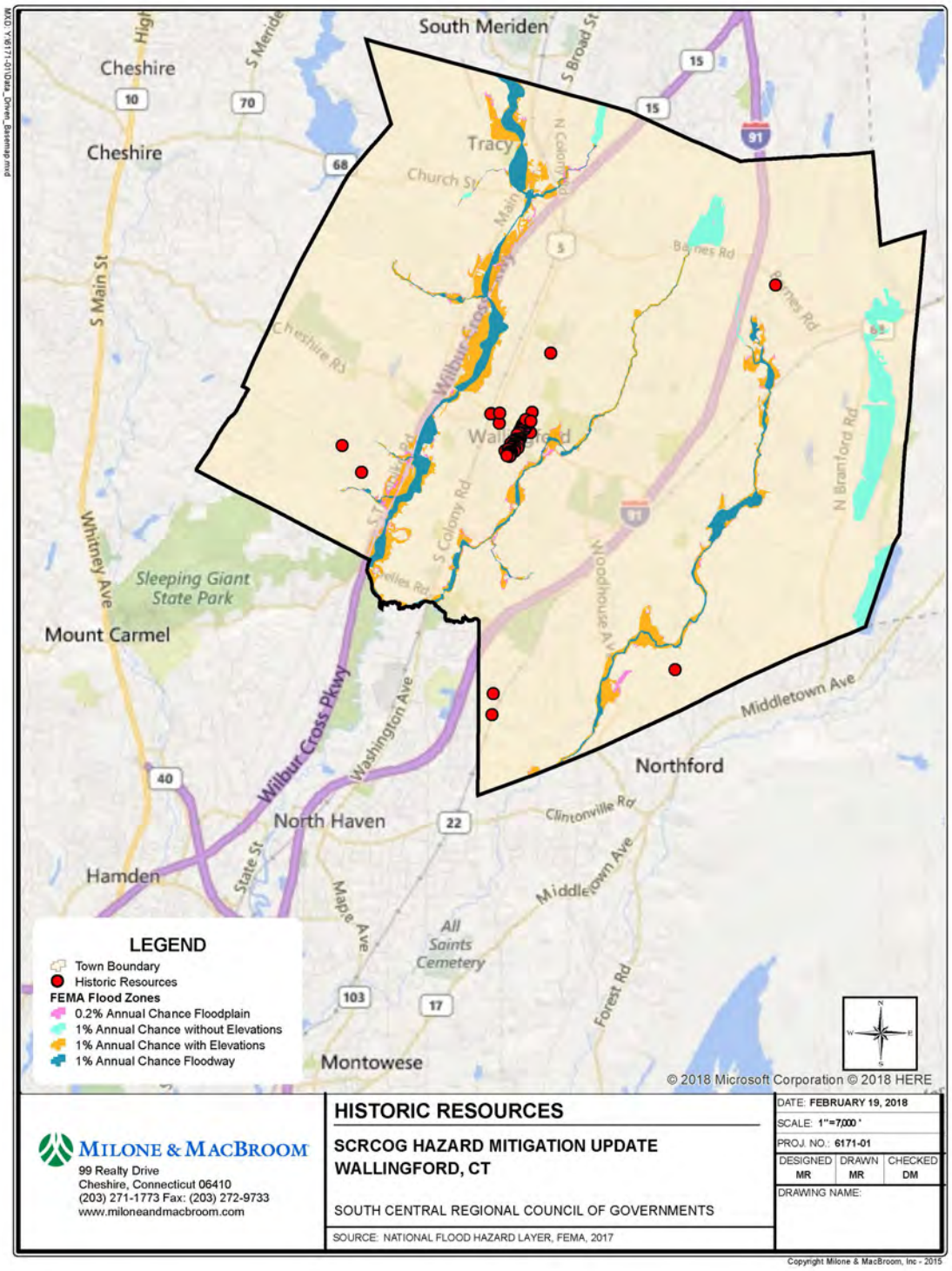


Figure 4.69 - Historic Resources Map – Wallingford

REPETITIVE LOSS AND SEVERE REPETITIVE LOSS PROPERTIES

In addition to the spatial analysis conducted above, summary information for repetitive flood loss and severe repetitive flood loss properties within the Town of Wallingford also provides an indication of vulnerable assets, especially with regard to properties insured under the National Flood Insurance Program that have experienced repeated flooding (see **Table 4-167**).[358]

Table 4-167 Repetitive Flood Loss and Severe Repetitive Flood Loss Summary - Wallingford

	Number of Losses	Number of Properties	Building Payments	Contents Payments	Total Payments
Repetitive Loss	25	11	$166,169	$286,711	$452,880
Severe Repetitive Loss	0	0	$0	$0	$0

The majority of the RL properties are single-family homes. Two are residential condominium units. Only two RL properties are non-residential, and these appear to be commercial and industrial uses.

As of December 31, 2012, the Town of Wallingford had a total of 125 claims totaling $888,218 in losses for all NFIP-insured structures. By July 31, 2017, that number had grown to 127 claims totaling $900,437.

Figure 4-82 and Figure 4-83 show dam and wildfire hazard areas within the Town of Wallingford.

[358] Based on information provided by the Federal Emergency Management Agency current as of 11/30/2012.

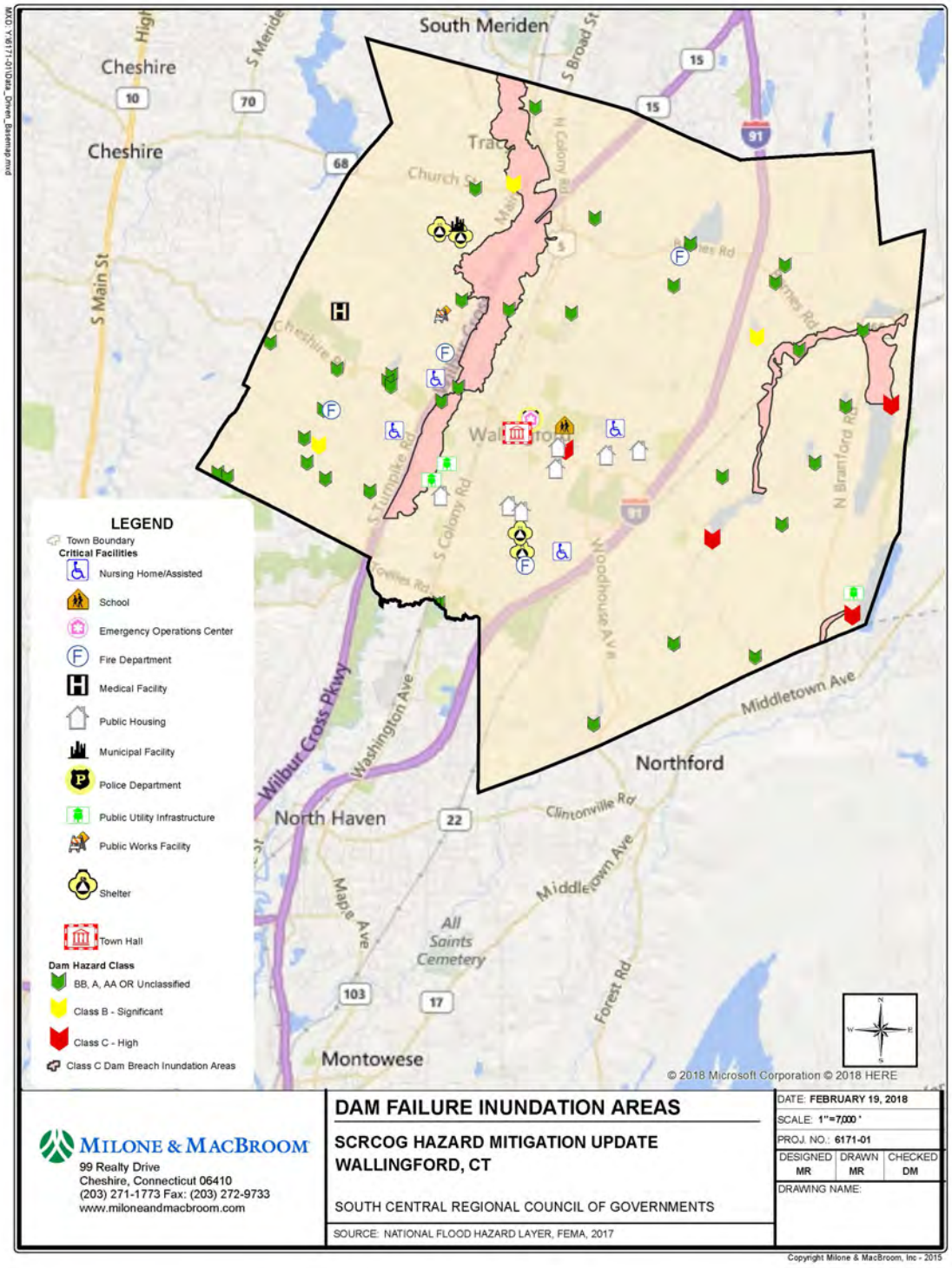


Figure 4-82 Dams Map - Wallingford

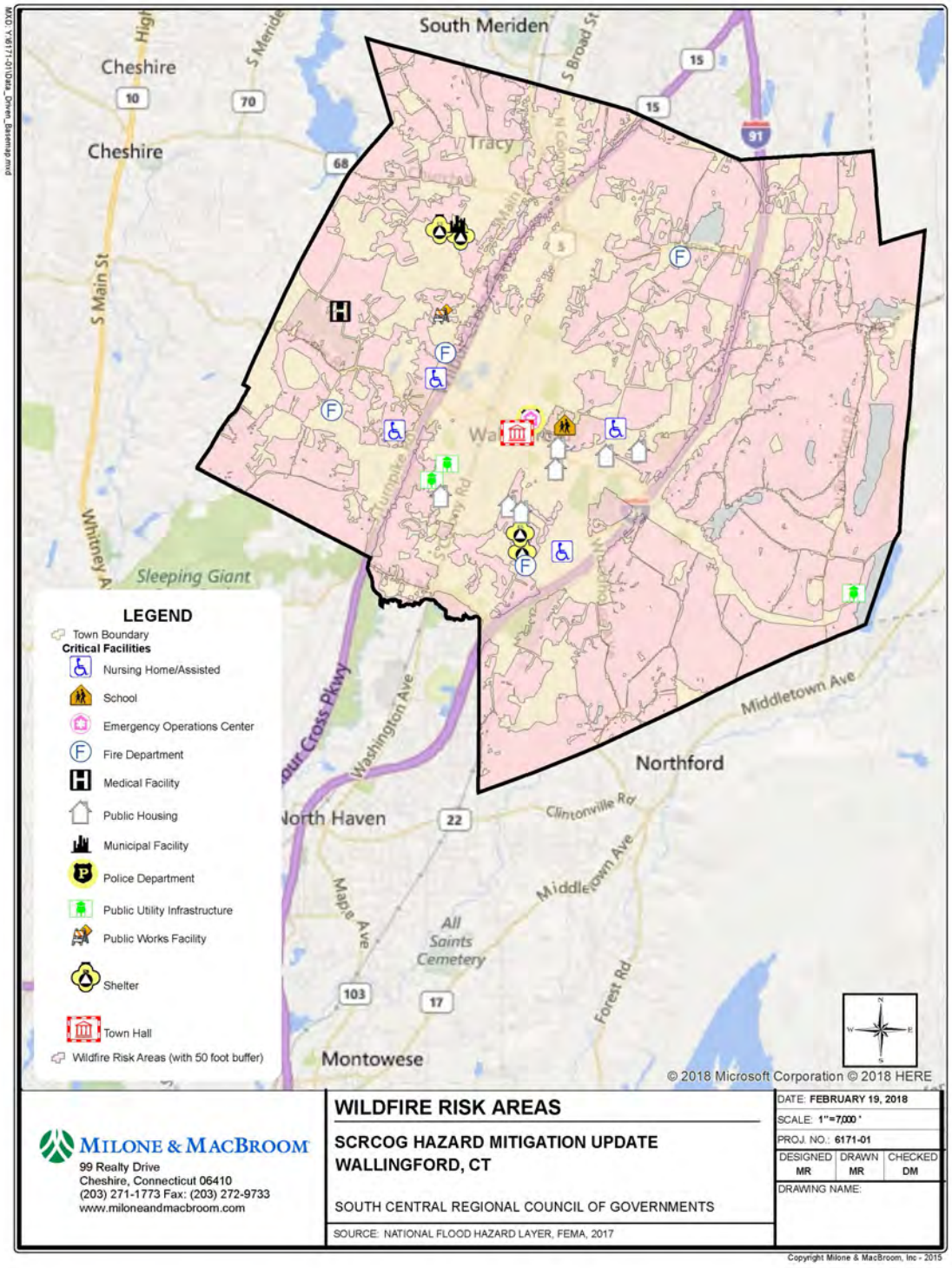


Figure 4-83 Wildfire Map - Wallingford

POTENTIAL IMPACTS—WALLINGFORD

Table 4-168 shows the total estimated value of improved parcels (parcels that contain at least one building), critical facilities, and historic assets that intersect with known hazard areas, as an indicator of the potential impacts should a hazard event occur. Parcel value was not available for the town of Wallingford, as it was not included in the GIS shapefile.

Table 4-168 Potential Impacts by Hazard - Wallingford[359]

Hazard	Value of At-Risk Parcels[360]	Value of At-Risk Critical Facilities[361]	Value of At-Risk Historic Assets
Extreme Temperatures	N/A	N/A	N/A
Hurricane/Tropical Storm	N/A	N/A	N/A
Severe Thunderstorm	N/A	N/A	N/A
Severe Winter Storm/Nor'easter	N/A	N/A	N/A
Tornado	N/A	N/A	N/A
Dam Failure			
High Hazard (Class C)	N/A	N/A	N/A
Significant Hazard[362] (Class B)	N/A	N/A	N/A
Drought	N/A	N/A	N/A
Flood[363][364]			
1-Percent-Annual-Chance	N/A	N/A	N/A
0.2-Percent-Annual-Chance	N/A	N/A	N/A
Zone VE	N/A	N/A	N/A
Category 1 Storm Surge	N/A	N/A	N/A
Category 2 Storm Surge	N/A	N/A	N/A
Category 3 Storm Surge	N/A	N/A	N/A
Category 4 Storm Surge	N/A	N/A	N/A
Sea Level Rise	N/A	N/A	N/A
Earthquake	N/A	N/A	N/A
Wildfire	N/A	N/A	N/A

[359] Wallingford does not releasee parcel valuation information, thus the table cannot be completed for this town.
[360] Based on estimated exposure values from Hazus-MH (building values only).
[361] Based on estimated building values from Hazus-MH.
[362] Dam failure inundation mapping was available for Class C dams. Inundation mapping was not available for other dams located in the town.
[363] Results for the flood hazard are not cumulative. Numbers and values of assets for events of increasing magnitude should be read as "in addition to" the preceding magnitudes.
[364] Results for the hurricane inundation areas are cumulative. Numbers and values of assets for events of increasing magnitude should be read as "consisting of" the preceding magnitudes.

LOSS ESTIMATES—WALLINGFORD

DETAILED HAZUS-MH LOSS ESTIMATES

Riverine Flood

Estimated building losses for the riverine flood hazard generated by Hazus-MH are broken down into two categories: direct building losses and business interruption losses. The direct building losses are the estimated costs to repair or replace the damage caused to the building and its contents. The business interruption losses are the losses associated with the inability to operate a business because of the damage sustained during the flood. Business interruption losses also include the temporary living expenses for those people displaced from their homes because of the flood (see **Table 4-169**).

Table 4-169 Riverine Flood Loss Estimates (1-Percent-Annual-Chance Flood) - Wallingford

	2014 Results Millions of Dollars					2017 Results Millions of Dollars				
	Residential	Commercial	Industrial	Others	Total	Residential	Commercial	Industrial	Others	Total
Direct Building Loss										
Building	$10.16	$8.66	$12.10	$2.22	$33.14	$16.49	$7.98	$6.51	$1.48	$32.47
Contents	$5.26	$21.02	$29.30	$13.31	$68.89	$7.65	$16.14	$17.96	$7.72	$49.47
Inventory	$0	$0.52	$3.63	$0.02	$4.17	$0.00	$0.35	$2.36	$0.01	$2.71
Subtotal	**$15.42**	**$30.20**	**$45.03**	**$15.55**	**$106.20**	**$24.14**	**$24.48**	**$26.83**	**$9.22**	**$84.65**
Business Interruption										
Income	$0	$0.13	$0.01	$0.07	$0.21	$0.00	$0.08	$0.00	$0.03	$0.11
Relocation	$0.01	$0.03	$0.01	$0.03	$0.08	$0.02	$0.01	$0.00	$0.01	$0.04
Rental Income	$0	$0.02	$0	$0	$0.02	$0.00	$0.01	$0.00	$0.00	$0.01
Wage	$0	$0.10	$0.01	$0.19	$0.30	$0.00	$0.05	$0.00	$0.09	$0.14
Subtotal	$0.01	$0.28	$0.03	$0.29	$0.61	$0.02	$0.15	$0.00	$0.13	$0.30
TOTAL	**$15.43**	**$30.48**	**$45.06**	**$15.84**	**$106.81**	**$24.16**	**$24.63**	**$26.83**	**$9.35**	**84.96**

In addition, the Hazus-MH model estimates 367 households will be displaced due to the flood. Displacement includes households evacuated from within or very near to the inundated area. Of these, 762 people will seek temporary shelter in public shelters.

These inland flooding results show a decrease in the losses from a 1% annual-chance flood between previous and current Hazus-MH results. It is possible that changes in flood-zone mapping and flood depth calculation methodologies are the primary reasons for those differences, along with incremental improvements in the Hazus-MH program over the last few years.

Hurricane Wind

Hazus-MH was used to model probabilistic hurricane wind impacts for the 10-, 20-, 50-, 100-, 200-, 500- and 1,000-year events. These annualized return periods compare to the Saffir-Simpson Scale in the following way:

- 10-year Tropical Depression/Tropical Storm
- 20-year Tropical Storm
- 50-year Tropical Storm/Category 1
- 100-year Category 1/Category 2
- 200-year Category 2
- 500-year Category 3
- 1000-year Category 3

The number of buildings estimated to be damaged and the resulting building-related economic losses are shown in **Table 4-170, Table 4-171,** and **Table 4-172**.

Table 4-170 Number of Buildings Damaged - Wallingford

	Return Period	Minor	Moderate	Severe	Destruction	Total
2014 Results	10-year	0	0	0	0	0
	20-year	15	1	0	0	16
	50-year	224	17	1	0	242
	100-year	1,189	144	5	1	1,339
	200-year	2,939	604	42	19	3,604
	500-year	5,094	1,977	314	161	7,546
	1,000-year	5,775	3,354	907	499	10,535
2017 Results	10-year	0	0	0	0	0
	20-year	12	0	0	0	12
	50-year	72	4	0	0	76
	100-year	398	35	1	0	434
	200-year	1,201	145	6	1	1,353
	500-year	2,796	547	34	13	3,390
	1,000-year	4,114	1,115	107	48	5,384

Table 4-171 Building-Related Economic Losses - Wallingford

	Return Period	Minor	Moderate	Severe	Destruction	Total
2014 Results	10-year	$0	$0	$0	$0	$0
	20-year	$357,160	$0	$0	$0	$357,160
	50-year	$8,372,060	$399,240	$135,570	$81,760	$8,988,630
	100-year	$26,975,040	$3,283,570	$1,187,270	$692,400	$32,138,280
	200-year	$71,226,270	$12,333,190	$5,888,160	$3,496,240	$92,943,860
	500-year	$233,928,070	$48,875,240	$27,126,790	$11,607,120	$321,537,220
	1,000-year	$506,213,070	$124,731,460	$63,411,650	$31,979,440	$726,335,620
2017 Results	10-year	$0	$0	$0	$0	$0
	20-year	$39,620	$0	$0	$0	$0
	50-year	$7,141,190	$223,590	$55,870	$48,860	$7,469,510
	100-year	$22,929,800	$966,240	$325,630	$213,240	$24,434,910
	200-year	$48,140,980	$3,958,200	$1,563,860	$1,059,780	$54,722,820
	500-year	$110,316,810	$14,743,870	$7,361,720	$3,958,340	$136,380,740
	1,000-year	$203,833,010	$30,762,600	$16,858,000	$8,499,260	$259,952,880

Table 4-172 Other Hurricane Impacts - Wallingford

	Return Period	Debris Generated (Tons)	Households Displaced	Individuals Seeking Temporary Shelter
2014 Results	10-year	0	0	0
	20-year	17	0	0
	50-year	1,885	0	0
	100-year	10,835	8	0
	200-year	20,674	42	8
	500-year	37,061	149	32
	1,000-year	59,488	296	64

Other modeled impacts of this event include the following effects on essential facilities:

- After a 50-year hurricane, 1 of 2 hospitals is likely to experience at least moderate damage
- After a 100-year hurricane, 1 of 2 hospitals is likely to experience at least moderate damage
- After a 200-year hurricane, 1 of 2 hospitals is likely to experience at least moderate damage
- After a 500-year hurricane:
    - Zero of 591 hospital beds are available for use (2 of 2 hospitals lose at least one day of use and are likely to experience at least moderate damage); after one week, 15% of hospital beds are available; by 30 days, 100% of the beds are available.
    - 17 of 18 schools are expected to lose at least one day of use
- After a 1,000-year hurricane:
    - Zero of 591 hospital beds are available for use after one week (2 of 2 hospitals lose at least one day of use and are likely to experience at least moderate damage); by 30 days, 100% of the beds are available.
    - 18 of 18 schools are expected to lose at least one day of use

These hurricane wind results show a decrease in the losses from high wind events between previous and current Hazus-MH results. The difference in results is most likely explained by incremental improvements in the Hazus-MH program over the last few years.

Earthquake

An earthquake scenario was developed using Hazus-MH that models a magnitude 6.4 earthquake with an epicenter 10 kilometers below East Haddam. The number of buildings estimated to be damaged and the resulting building-related economic losses are shown in Table 4-173 and **Table 4-174.**

Table 4-173 Number of Buildings Damaged - Wallingford

	Slight	Moderate	Extensive	Complete	Total
Count	3,712	1,770	632	231	6,345

Table 4-174 Building-Related Economic Losses - Wallingford

	Residential	Commercial	Industrial	Others	Total
Losses	$234,320,000	$362,750,000	$140,940,000	$99,050,000	$837,060,000

Other modeled impacts of this event include:

- Essential Facilities:
  - No essential facilities experience at least moderate damage
  - Following the event, the functionality of essential facilities is as follows:
    - Hospital: of 591 beds, 39% are available after one day, 62% after one week, and 86% after 30 days; 2 of 2 are less than 50% functional on day 1
    - Schools: 0 of 18 are more than 50% functional the day after the event
    - Police Stations: zero of two are more than 50% functional the day after the event
    - Fire Stations: zero of one are more than 50% functional the day after the event
- Transportation Infrastructure:
  - All 51 highway segments are more than 50% functional on day one
  - 11 highway bridges experience at least moderate damage; of 44 bridges, 33 are more than 50% functional on day one, 43 by the end of one week; highway losses total $41.38 million
  - Railway system remains more than 50% functional on day one; railway losses are $440,000
  - The airport remains more than 50% functional on day one; total losses are $1.76 million
- Utilities:
  - Potable water pipelines: 251 leaks and 63 breaks. Total water system losses are $1.13 million
  - The waste water system is less than 50% functional after day 1, functionality is returned by day 7; waste water pipelines experience 180 leaks and 45 breaks; total waste water system losses are $7.13 million
  - Natural gas pipelines: 52 leaks and 13 breaks, a loss of $230,000
  - The electrical power system is less than 50% functional after day 1, functionality is returned by day 7; total losses are $12.44 million
  - Communication system losses total $10,000
  - 638 households are without potable water service on day 1; by day 3 service is restored
- Shelter: 560 household will be displaced, with 293 individuals seeking temporary shelter in public shelters
- 19 to 93 individuals may require hospitalization and 4 to 23 individuals may be killed, depending on the time of day the earthquake strikes

ANNUALIZED LOSS ESTIMATES

Table 4-175 shows annualized loss estimates (ALE) for each hazard. Estimates were derived from a number of sources, as described in the Methodology section, and included in column two of the table:

- NFIP: Historic flood insurance claims processed for the community
- PA: Historic Public Assistance grants awarded to the community
- State HMP: Localized estimates based on those presented in the 2014 Connecticut Hazard Mitigation Plan
- HAZUS: Hazus-MH results from modeling performed for this multi-jurisdictional plan
- State HAZUS: Hazus-MH results from modeling performed for the 2014 Connecticut Hazard Mitigation Plan

Hazus-MH results for flooding and earthquake hazards (as run for this multi-jurisdictional plan) were not able to be annualized, and so are not included in the table below.

Table 4-175 Annualized Loss Estimates by Hazard – Wallingford

Hazard	Source	Annualized Loss Estimate
Flooding	NFIP	$23,088
	PA	$56,280
	State HMP	$10,391
Hurricane Wind Thunderstorm	HAZUS	$1,215,819
	PA	$28,140
	State HMP	$4,240
Tornado Winter Storm Dam Failure	State HMP	$442,459
	PA	$108,505
	State HMP	$328
	State HMP	$1,803
Wildfire	State HMP	$23,319
Earthquake	State HAZUS	$85,305

PROBLEM STATEMENTS—WALLINGFORD

Table 4-176 provides statements of particular interest with regard to primary hazards of concern, geographic areas of concern, and vulnerable community assets within the Town of Wallingford. If applicable, any noted potential solutions or mitigation actions are discussed with the problem statements.

Table 4-176 Problem Statements - Wallingford

Primary Hazards of Concern	
Trees	**Trees**-related hazards are among the Town's most significant recurring and widespread issues, particularly the downing of electric and communication lines during **hurricane/tropical storm** and **severe winter storm** events. Potential solutions/mitigation actions: regular tree pruning activities are in place, and the Town has made a lot of investments in protecting communications infrastructure from less severe and more frequent events, but impacts from large-scale events will be felt across a wide area.
Hurricane/tropical storm	**Hurricane/tropical storm** identified as #1 hazard by Town officials.
Riverine flooding	**Riverine flooding** is also a major concern, especially along the Quinnipiac River and its tributaries which does result in flooding of homes (not just roadways). The Quinnipiac River is inundated with trees and silt that causes flooding at Warehouse Point.
Urban flooding	**Urban flooding** is periodically a problem in certain isolated areas.
Severe winter storms and ice storms	**Severe winter storms and ice storms** have caused many concerns about roof collapses. The Town does not have resident engineering expertise regarding snow loads.
	Potential solutions/mitigation actions: educational material for building owners on steps to be taken regarding assessing and minimizing threats to roofs from snow loads.
Geographic Areas of Concern	
Main Street Homes Trailer Park	**Main Street Homes Trailer Park** (approx. 210-220 block of Main Street) – recurring severe/velocity flooding of mobile homes immediately adjacent to Quinnipiac River, located behind non-engineered earthen berm. Many residents are elderly and have had to be evacuated on multiple occasions. History of major damages and still deemed high risk area.
	Potential solutions/mitigation actions:
	Acquisition/relocation was considered in past but not deemed cost-effective (will not pass FEMA's Benefit-Cost Analysis requirements).

	Some elevations have been completed.
	Pump system in place at berm, but deemed inadequate.
North Turnpike Road @ River Road	**North Turnpike Road @ River Road** (near Fitness 4000) – past flooding of basements and some first floors in this area.
Fritz Place	**Fritz Place** – periodic flooding reported.
S. Colony Road @ S. Elm Street	**S. Colony Road @ S. Elm Street** – periodic flooding of intersection.
	Have added a larger pipe and catch basins here but there may be flooding downstream.
Hampton Trail @ Grieb Trail	**Hampton Trail @ Grieb Trail** (area north of Spring Lake) – concerns with periodic flooding of Muddy River. Larger pipe has been installed but flooding may still occur if catch basins fill with debris.
Vulnerable Community Assets	
Sheehan High School	Sheehan High School is the designated shelter for the town and does not have a generator.
	The School is considered a shelter. It does not have a generator. However, the Mayor feels since this is a critical facility power will be restored to the facility quickly so it does not need a generator.
	13 critical facilities are within proximity to either a high hazard or a significant hazard dam. Further study is necessary to determine if a dam failure could potentially impact any or these facilities

CHANGES/IMPROVEMENTS SINCE 2014

- Center Street (Rt. 150) @ Wharton Brook (near 550 block) – history of flash flood events that have flooded commercial buildings and residences along Center Street. Roadway flooding presents severe life/safety threat (multiple rescues and one past fatality). Believed to be a brush/debris issue associated with culverts and drainage system.
- A new bridge was built here to alleviate this issue.
- West Dayton Hill Road @ Dayton Pond Dam – reported periodic flooding in areas surrounding of dam (classified as moderate hazard potential).
- New Bridge will alleviate flooding here.
- N. Main Street Ext. @ Beaumont Road – reported flooding issues surrounding existing detention basin.
- New construction here.
- The Central Fire HQ has a 40-year-old generator, which is need of replacement.
- This generator was replaced.
- Mapleview Road @ Wharton Brook – very periodic and isolated flooding.
- The Public Works Operation Center does not have an emergency generator.
- Public Works now has a generator for the whole building.

WEST HAVEN

CRITICAL FACILITIES – WEST HAVEN

Table 4-177 contains a list of critical facilities provided by the City of West Haven. These are depicted on Figure 4-84 along with FEMA flood zones.

Table 4-177 Critical Facilities – West Haven

Facility	Location	Emergency Power Supply?	Shelter?	In Floodplain or Coastal Flood Hazard Area?	In Surge Zones?
Emergency Services					
Police Department	200 Sawmill Road	Yes	N/A	No	No
Emergency Operations Center	city hall	Yes	N/A	No	No
Fire Station #1	366 Elm St	Yes	N/A	No	No
Fire Station #2	860 Ocean Av	Yes	N/A	Yes	N/A
Fire Station #3	20 Admiral St	Yes	N/A	No	No
Municipal Facilities					
High School	1 Circle St	Yes	N/A	Grounds (Not bldg)	No
City Hall	355 Main St	Yes	N/A	No	No
Shelters					
Carrigan Middle School	2 Tetlow St	Yes	Yes	No	No
Water and Wastewater					
WWTP	Beach Street	Yes	N/A	Yes	Yes
Main Pump Station	Blohm & Anderson	Yes	N/A	Yes	No
East Ave PS	Beach &East Ave	Yes	N/A	Yes	Yes
Dawson Av PS	1 Dawson Av	Yes	N/A	Yes	Yes
Trumbull PS	4 Trumbull St	Yes	N/A	Yes	Yes
Woodmont Road PS	160 Woodmont Road	Yes	N/A	Yes	No
Oyster River PS	171 Beatrice Dr.	Yes	N/A	No	No
Cove River PS	350 Painter Dr	Yes	N/A	Yes	No
Savin Av PS	423 Captain Thomas Blvd. PS	Yes	N/A	Yes	No
Front Av PS	157 Front Av	Yes	N/A	No	No
Jones St PS	172 Jones St	Yes	N/A	Yes	No
Morrisey Ln PS	69 Morrisey Ln	Yes	N/A	No	No
Woodycrest PS	525 Ocean Av	Yes	N/A	No	Yes
Baybrook PS	1 Bayshore Dr	Yes	N/A	Yes	No
Health Care and Senior Living Facilities					
Morrissey Manor Senior Housing	Bayshore Dr	No	N/A	Yes	No
Surfside	200 Oak St	Yes	N/A	Yes	No
Prete Housing	1187 Campbell Av	Yes	N/A	No	No
VA Medical Center	950 Campbell Av	Yes	N/A	No	No
Paradigm Health Care	310 Terrace Av	N/A	N/A	No	No
Apple Rehab Center	308 Savin Av	N/A	N/A	No	No

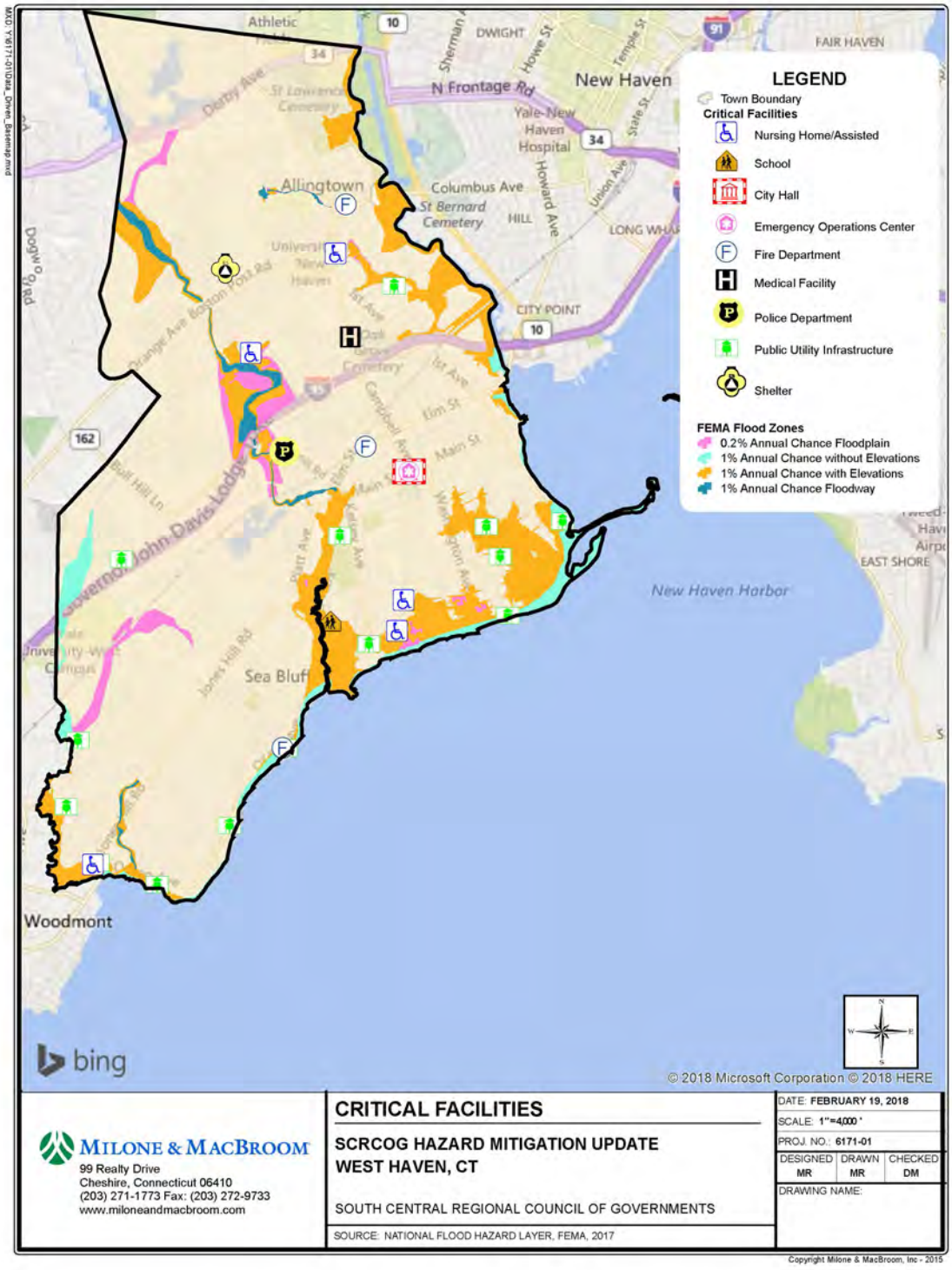


Figure 4-84 Critical Facilities and SFHA Map – West Haven

VULNERABLE ASSETS—WEST HAVEN

Vulnerable assets were identified by intersecting GIS-based asset inventories and demographic data with known hazard boundaries to determine the number of parcels, buildings, critical facilities, historic assets, and populations exposed to each hazard. This results in an estimation of vulnerable assets by hazard as shown in **Table 4-178.** **Figure 4-85** depicts the locations of historic resources.

Table 4-178 Vulnerable Assets by Hazard - West Haven

Hazard	Number of Parcels[365]	Number of Buildings[366]	Critical Facilities[367]	Historic Assets[368]	Population[369]
Extreme Temperatures	14,443	17,687	36	37	55,564
Hurricane/Tropical Storm	14,443	17,687	36	37	55,564
Severe Thunderstorm	14,443	17,687	36	37	55,564
Severe Winter Storm/Nor'easter	14,443	17,687	36	37	55,564
Tornado	14,443	17,687	36	37	55,564
Coastal Erosion[370]	107	108	0	0	268
Dam Failure					
High Hazard (Class C)	141	82	0	0	203
Significant Hazard[371] (Class B)	N/A	N/A	N/A	N/A	N/A
Drought	14,443	17,687	36	37	55,564
Flood[372]					
1-Percent-Annual-Chance	1,750	1,199	11	0	2,974
0.2-Percent-Annual-Chance	338	243	0	0	603
Zone VE	184	67	0	0	166
Category 1 Storm Surge	906	231	1	0	573
Category 2 Storm Surge	1,935	1,252	10	0	3,105
Category 3 Storm Surge	2,208	2,136	4	0	5,297
Category 4 Storm Surge	2,068	1,941	3	16	4,814
Sea Level Rise	120	465	0	0	1,153
Earthquake	14,443	17,687	36	37	55,564
Wildfire	437	147	2	0	365

[365] Based on data provided by the Town of Branford.
[366] Based on building numbers from 2010 census data.
[367] Based on data provided by the Town of Branford.
[368] Based on data provided by the Town of Branford.
[369] Based on population numbers from 2010 census data.
[370] Coastal Erosion Hazard determined using Analysis of Shoreline Change in Connecticut - published by DEEP, Sea Grant, and UConn/CLEAR
[371] Dam failure inundation mapping was available for Class C dams. Inundation mapping was not available for other dams located in the town.
[372] Results for the flood hazard are not cumulative. Numbers and values of assets for events of increasing magnitude should be read as "in addition to" the preceding magnitudes.

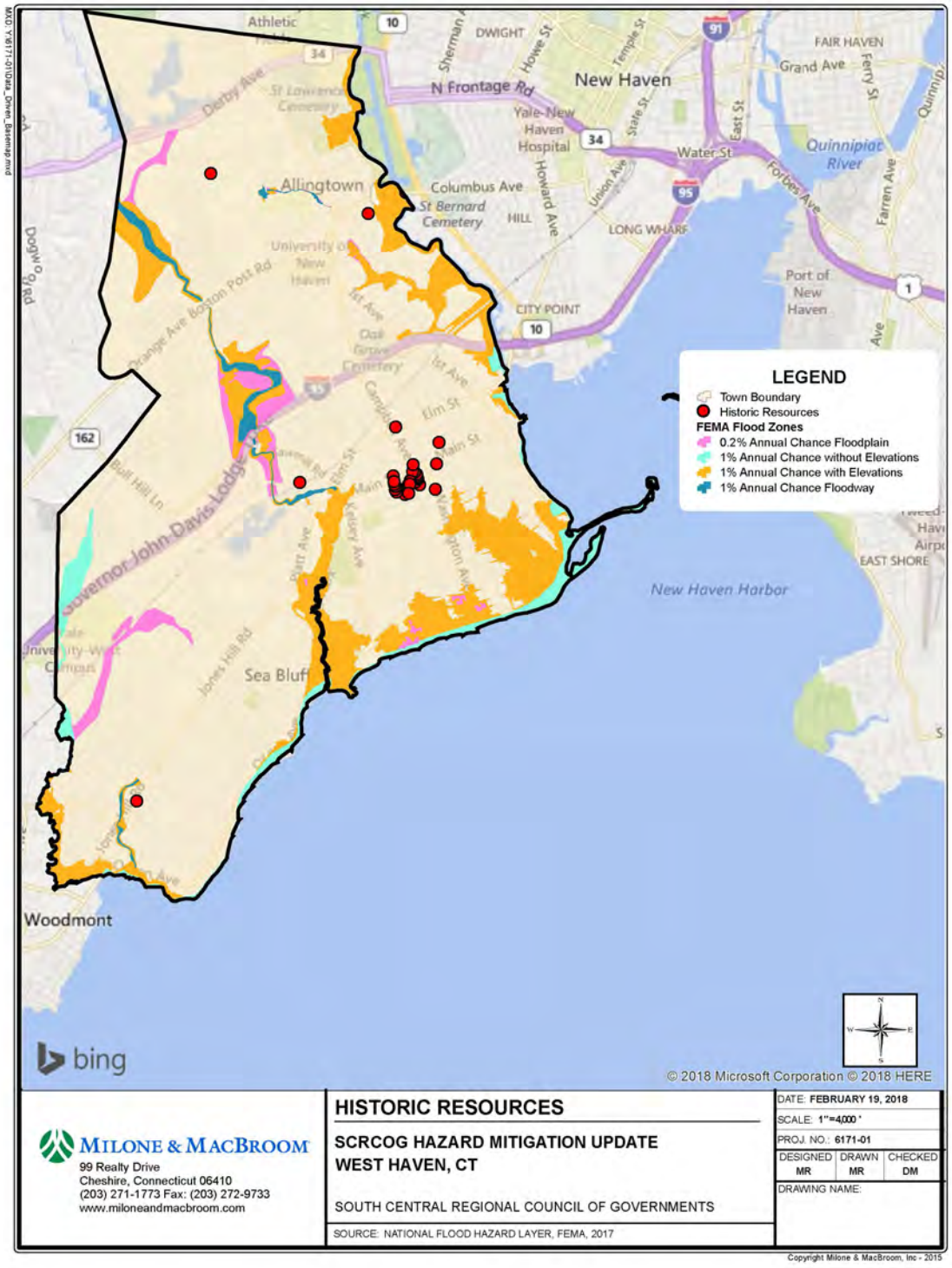


Figure 4-85 Historic Resources Map – West Haven

REPETITIVE LOSS AND SEVERE REPETITIVE LOSS PROPERTIES

In addition to the spatial analysis conducted above, summary information for repetitive flood loss and severe repetitive flood loss properties within the City of West Haven also provides an indication of vulnerable assets, especially with regard to properties insured under the National Flood Insurance Program that have experienced repeated flooding (see Table 4-179).[373]

Table 4-179 Repetitive Flood Loss and Severe Repetitive Flood Loss Summary - West Haven

	Number of Losses	Number of Properties	Building Payments	Contents Payments	Total Payments
Repetitive Loss	163	64	$2,730,875	$215,299	$2,946,175
Severe Repetitive Loss	26	2	$875,882	$0	$875,882

The majority of the RL properties are single-family homes. Three are residential condominium or apartment units and eight are multi-family homes. Only five RL properties are non-residential, and these appear to be commercial and industrial uses.

As of December 31, 2012, the City of West Haven had a total of 490 claims totaling $3,506,261 in losses for all NFIP-insured structures. By July 31, 2017, that number had grown to 498 claims totaling $4,841,463.

Figure 4-86 through Figure 4-89 show dams, storm surge, sea level rise, and wildfire hazard areas within the City of West Haven.

[373] Based on information provided by the Federal Emergency Management Agency current as of 12/31/2012.

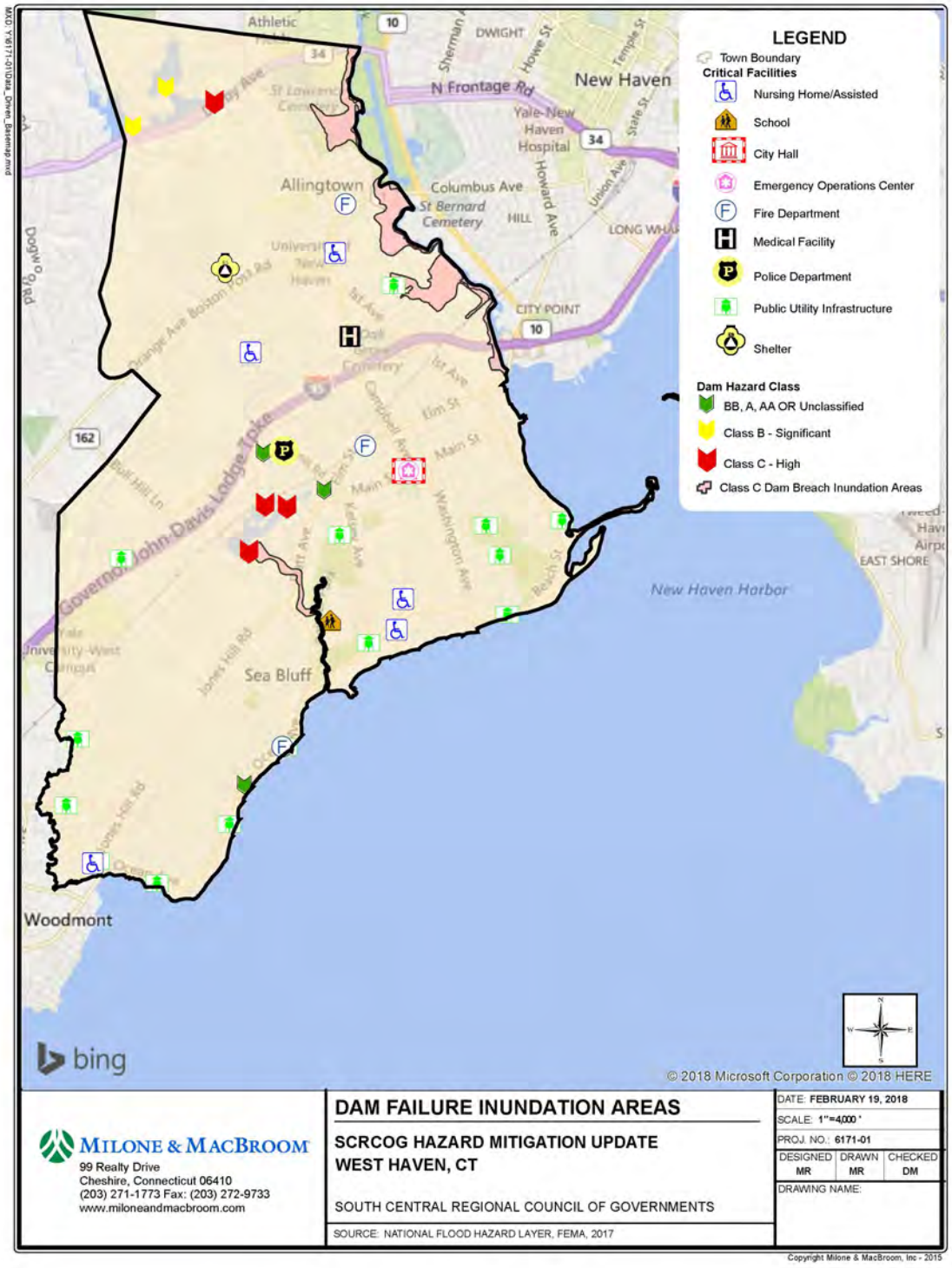


Figure 4-86 Dams Map – West Haven

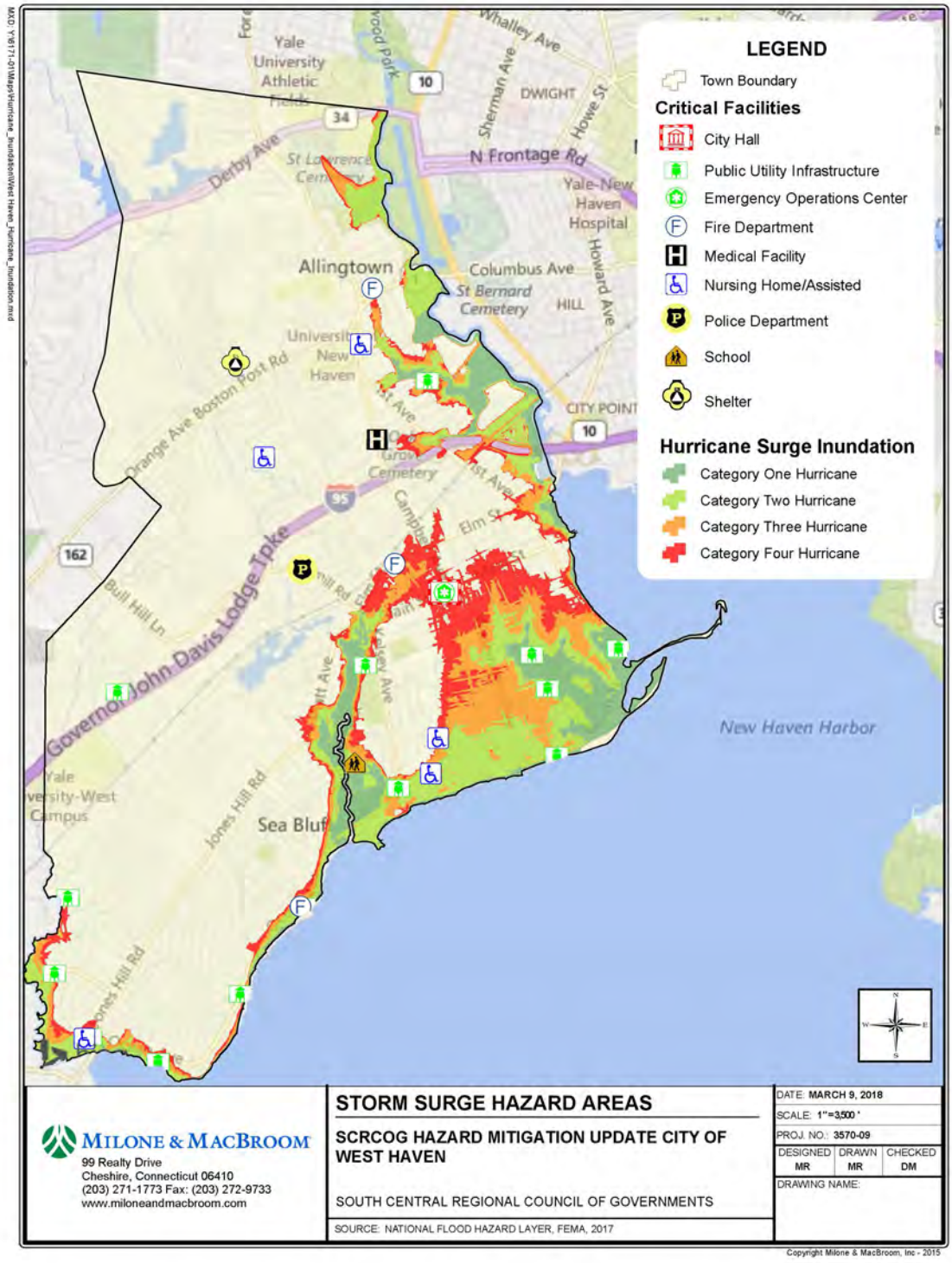


Figure 4-87 Hurricane Inundation Map – West Haven

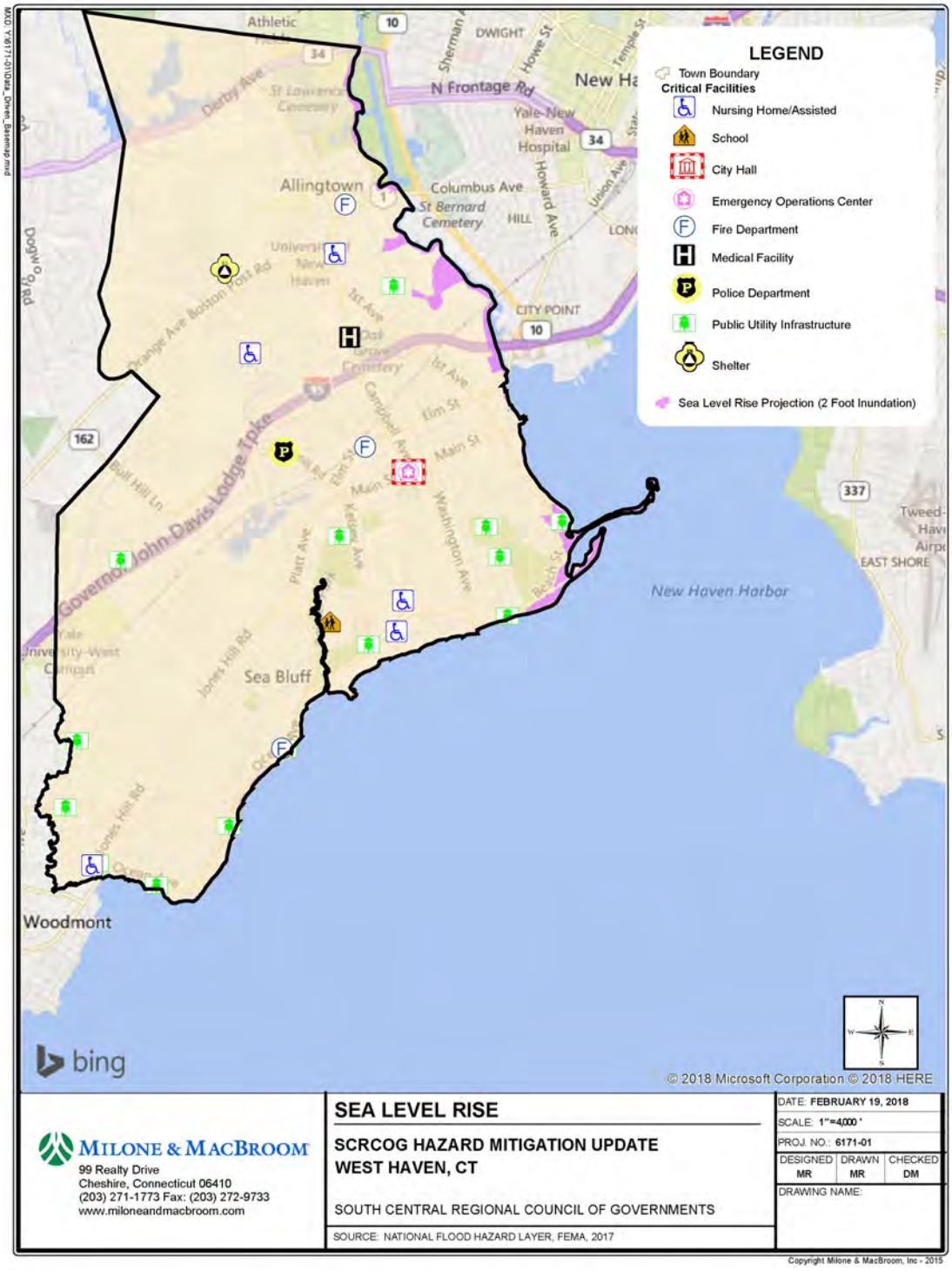


Figure 4-88 Sea Level Rise – West Haven

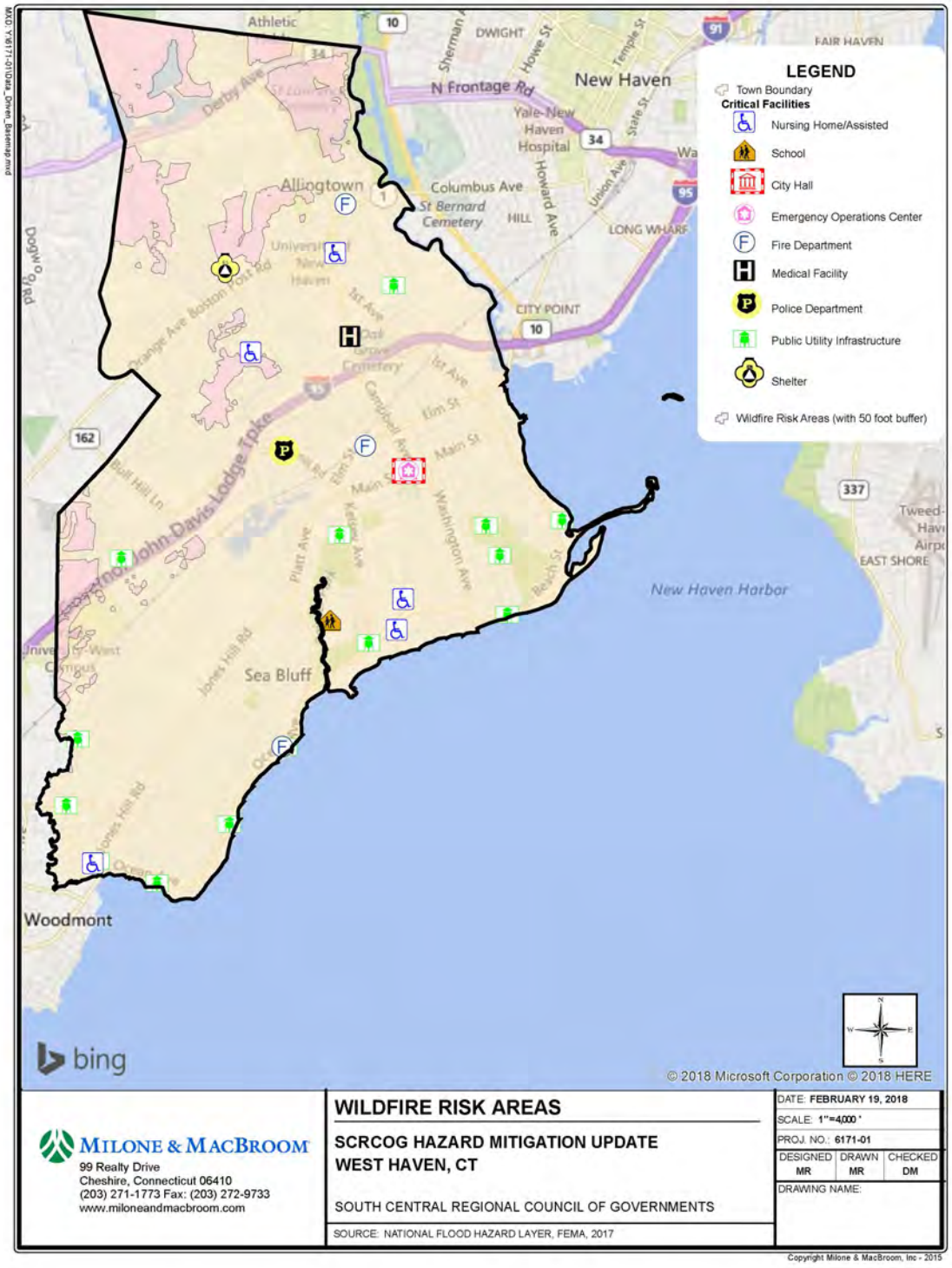


Figure 4-89 Wildfire Map – West Haven

POTENTIAL IMPACTS – WEST HAVEN

Table 4-180 shows the total estimated value of improved parcels (parcels that contain at least one building), critical facilities, and historic assets that intersect with known hazard areas, as an indicator of the potential impacts should a hazard event occur.

Table 4-180 Potential Impacts by Hazard - West Haven[374]

Hazard	Value of At-Risk Parcels[375]	Value of At-Risk Critical Facilities[376]	Value of At-Risk Historic Assets[377]
Extreme Temperatures	$3,900,705,170	$318,148,300	$26,183,300
Hurricane/Tropical Storm	$3,900,705,170	$318,148,300	$26,183,300
Severe Thunderstorm	$3,900,705,170	$318,148,300	$26,183,300
Severe Winter Storm/Nor'easter	$3,900,705,170	$318,148,300	$26,183,300
Tornado	$3,900,705,170	$318,148,300	$26,183,300
Coastal Erosion[378]	$29,559,500	$14,025,600	$0
Dam Failure			
High Hazard (Class C)	$84,309,600	$32,161,000	$3,781,000
Significant Hazard[379] (Class B)	N/A	N/A	N/A
Drought	$3,900,705,170	$318,148,300	$26,183,300
Flood[380][381]			
1-Percent-Annual-Chance	$728,115,721	$76,201,800	$3,781,000
0.2-Percent-Annual-Chance	$235,928,100	$22,806,800	$0
Zone VE	$108,933,209	$15,399,600	$0
Category 1 Storm Surge	$209,343,109	$47,171,600	$0
Category 2 Storm Surge	$521,304,716	$76,254,000	$3,781,000
Category 3 Storm Surge	$582,394,801	$76,841,100	$3,781,000
Category 4 Storm Surge	$630,062,022	$59,766,100	$26,066,400
Sea Level Rise	$12,040,500	$14,734,900	$0
Earthquake	$3,900,705,170	$318,148,300	$26,183,300
Wildfire	$79,066,386	$16,543,200	$0

[374] Potential Impacts are based on parcel exposure, not building exposure. It is possible for a historic asset or critical facility building to not be exposed, yet its associated parcel intersects a hazard area. The parcel value will then be reflected in the Potential Impacts Table.
[375] Based on data provided by the Town of Branford.
[376] Based on data provided by the Town of Branford.
[377] Based on data provided by the Town of Branford.
[378] Coastal Erosion Hazard determined using Analysis of Shoreline Change in Connecticut - published by DEEP, Sea Grant, and UConn/CLEAR
[379] Dam failure inundation mapping was available for Class C dams. Inundation mapping was not available for other dams located in the town.
[380] Results for the flood hazard are not cumulative. Numbers and values of assets for events of increasing magnitude should be read as "in addition to" the preceding magnitudes.
[381] Results for the hurricane inundation areas are cumulative. Numbers and values of assets for events of increasing magnitude should be read as "consisting of" the preceding magnitudes.

LOSS ESTIMATES—WEST HAVEN

DETAILED HAZUS-MH LOSS ESTIMATES

Riverine Flood

Estimated building losses for the riverine flood hazard generated by Hazus-MH are broken down into two categories: direct building losses and business interruption losses. The direct building losses are the estimated costs to repair or replace the damage caused to the building and its contents. The business interruption losses are the losses associated with the inability to operate a business because of the damage sustained during the flood. Business interruption losses also include the temporary living expenses for those people displaced from their homes because of the flood (see **Table 4-181**).

Table 4-181 Riverine Flood Loss Estimates (1-Percent-Annual-Chance Flood) - West Haven

	2014 Results Millions of Dollars					2017 Results Millions of Dollars				
	Residential	Commercial	Industrial	Others	Total	Residential	Commercial	Industrial	Others	Total
Direct Building Loss										
Building	$18.00	$2.69	$1.53	$0.63	$22.87	$12.26	$0.96	$0.37	$0.19	$13.78
Contents	$11.79	$6.79	$3.73	$3.67	$25.98	$7.84	$1.99	$0.85	$1.13	$11.80
Inventory	$0	$0.20	$0.67	$0	$0.87	$0.00	$0.04	$0.11	$0.00	$0.15
Subtotal	**$29.81**	**$9.68**	**$5.93**	**$4.30**	**$49.72**	**$20.09**	**$3.00**	**$1.32**	**$1.32**	**$25.73**
Business Interruption										
Income	$0	$0.06	$0	$0.01	$0.07	$0.00	$0.00	$0.00	$0.00	$0.01
Relocation	$0.03	$0.01	$0	$0	$0.04	$0.01	$0.00	$0.00	$0.00	$0.01
Rental Income	$0.01	$0.01	$0	$0	$0.02	$0.00	$0.00	$0.00	$0.00	$0.00
Wage	$0	$0.06	$0	$0.013	$0.073	$0.00	$0.00	$0.00	$0.03	$0.03
Subtotal	**$0.04**	**$0.14**	**$0**	**$0.023**	**$0.203**	**$0.01**	**$0.01**	**$0.00**	**$0.03**	**$0.05**
TOTAL	**$29.85**	**$9.82**	**$5.93**	**$4.323**	**$49.923**	**$20.11**	**$3.00**	**$1.32**	**$1.35**	**$25.78**

In addition, the Hazus-MH model estimates 271 households will be displaced due to the flood. Displacement includes households evacuated from within or very near to the inundated area. Of these, 709 people will seek temporary shelter in public shelters.

These inland flooding results show a significant decrease in the estimated losses from a 1% annual-chance flood between the previous and the current Hazus-MH results. It is likely that the change in the definitions of inland and coastal flood zones is the primary reason for those differences; in fact, while the inland flood damage estimates listed above have decreased since the previous Plan, coastal flood damage estimates (provided in the next section) have increased significantly.

Coastal Flood

Estimated building losses for the coastal flood hazard generated by Hazus-MH are broken down into two categories: direct building losses and business interruption losses. The direct building losses are the estimated costs to repair or replace the damage caused to the building and its contents. The business interruption losses are the losses associated with the inability to operate a business because of the damage sustained during the flood. Business interruption losses also include the temporary living expenses for those people displaced from their homes because of the flood (see **Table 4-182**).

Table 4-182 Coastal Flood Loss Estimates (100-year Event) - West Haven

	2014 Results Millions of Dollars					2017 Results Millions of Dollars				
	Residential	Commercial	Industrial	Others	Total	Residential	Commercial	Industrial	Others	Total
Direct Building Loss										
Building	$5.35	$0.75	$0.13	$0.01	$6.24	$33.04	$3.29	$1.75	$0.15	$38.21
Contents	$3.61	$1.66	$0.19	$0.05	$5.51	$26.46	$9.72	$4.09	$0.86	$41.13
Inventory	$0	$0.03	$0.03	$0	$0.06	$0.00	$0.18	$0.47	$0.00	$0.65
Subtotal	**$8.96**	**$2.44**	**$0.35**	**$0.06**	**$11.81**	**$59.49**	**$13.19**	**$6.31**	**$1.01**	**$80.00**
Business Interruption										
Income	$0	$0.02	$0	$0	$0.02	$0.00	$0.11	$0.00	$0.00	$0.11
Relocation	$0.01	$0	$0	$0	$0.01	$0.07	$0.01	$0.00	$0.00	$0.09
Rental Income	$0	$0	$0	$0	$0	$0.03	$0.01	$0.00	$0.00	$0.03
Wage	$0	$0.01	$0	$0.08	$0.09	$0.01	$0.10	$0.00	$0.19	$0.29
Subtotal	**$0.01**	**$0.03**	**$0**	**$0.08**	**$0.12**	**$0.11**	**$0.22**	**$0.00**	**$0.19**	**$0.52**
TOTAL	**$8.97**	**$2.47**	**$0.35**	**$0.14**	**$11.93**	**$59.60**	**$13.41**	**$6.31**	**$1.20**	**$80.52**

In addition, the Hazus-MH model estimates 1,330 households will be displaced due to the flood. Displacement includes households evacuated from within or very near to the inundated area. Of these, 3,532 people will seek temporary shelter in public shelters.

One of three fire stations is expected to experience at least moderate damage.

These coastal flooding results show a very significant increase in the estimated losses from a 1% annual-chance flood between the previous and the current Hazus-MH results. It is likely that the change in the definitions of inland and coastal flood zones is the primary reason for those differences; in fact, while the coastal flood damage estimates listed above have increased since the previous Plan, inland flood damage estimates (provided in the previous section) have decreased very significantly. It is likely that the New Haven County FIS update is another key reason for the loss estimate increase.

Hurricane Wind

Hazus-MH was used to model probabilistic hurricane wind impacts for the 10-, 20-, 50-, 100-, 200-, 500- and 1,000-year events. These annualized return periods compare to the Saffir-Simpson Scale in the following way:

- 10-year Tropical Depression/Tropical Storm
- 20-year Tropical Storm
- 50-year Tropical Storm/Category 1
- 100-year Category 1/Category 2
- 200-year Category 2
- 500-year Category 3
- 1000-year Category 3

The number of buildings estimated to be damaged and the resulting building-related economic losses are shown in **Table 4-183, Table 4-184,** and **Table 4-185.**

Table 4-183 Number of Buildings Damaged - West Haven

	Return Period	Minor	Moderate	Severe	Destruction	Total
2014 Results	10-year	0	0	0	0	0
	20-year	24	1	0	0	25
	50-year	327	37	1	0	365
	100-year	1,590	273	11	2	1,876
	200-year	3,550	963	69	29	4,611
	500-year	5,622	2,760	481	238	9,101
	1,000-year	5,806	4,251	1,270	690	12,017
2017 Results	10-year	0	0	0	0	0
	20-year	18	1	0	0	19
	50-year	129	11	1	0	141
	100-year	674	89	3	0	766
	200-year	1,719	315	14	3	2,051
	500-year	3,585	1,052	85	35	4,757
	1,000-year	4,739	1,904	241	113	6,997

Table 4-184 Building-Related Economic Losses - West Haven

	Return Period	Minor	Moderate	Severe	Destruction	Total
2014 Results	10-year	$0	$0	$0	$0	$0
	20-year	$882,340	$0	$0	$0	$882,340
	50-year	$12,573,620	$296,860	$84,530	$48,450	$13,003,460
	100-year	$42,928,810	$2,685,070	$906,910	$627,750	$47,148,540
	200-year	$108,316,340	$10,653,770	$4,561,720	$2,547,740	$126,079,570
	500-year	$345,118,290	$45,710,010	$19,828,250	$8,885,470	$419,542,020
	1,000-year	$709,616,980	$115,139,360	$43,690,920	$19,257,130	$887,704,390
2017 Results	10-year	$0	$0	$0	$0	$0
	20-year	$246,190	$0	$0	$0	$246,190
	50-year	$9,685,730	$204,560	$50,320	$42,000	$9,982,610
	100-year	$33,532,070	$1,153,450	$364,580	$181,380	$35,231,490
	200-year	$73,564,180	$4,363,190	$1,593,390	$961,720	$80,482,480
	500-year	$183,635,410	$17,243,700	$7,188,130	$3,638,930	$211,706,170
	1,000-year	$335,897,790	$36,674,120	$16,305,380	$7,167,580	$396,044,870

Table 4-185 Other Hurricane Impacts – West Haven

Return Period	Debris Generated (Tons)	Households Displaced	Individuals Seeking Temporary Shelter
10-year	0	0	0
20-year	68	0	0
50-year	2,150	1	0
100-year	7,355	39	10
200-year	15,549	135	34
500-year	32,555	407	102
1,000-year	50,641	767	188

Other modeled impacts of this event include the following effects on essential facilities:

- After a 50-year hurricane, 1 of 1 hospitals is likely to experience at least moderate damage
- After a 100-year hurricane, 1 of 1 hospitals is likely to experience at least moderate damage
- After a 200-year hurricane, zero of 200 hospital beds are available for use after one day (1 of 1 hospitals lose at least one day of use and is likely to experience at least moderate damage); after one week, 100% of the beds are available.
- After a 500-year hurricane:
    - Zero of 200 hospital beds are available for use after one week (1 of 1 hospitals lose at least one day of use and is likely to experience at least moderate damage); after 30 days, 100% of the beds are available.
    - All 17 schools are expected to lose at least one day of use
- After a 1,000-year hurricane:
    - Zero of 200 hospital beds are available for use after one week (1 of 1 hospitals lose at least one day of use and is likely to experience at least moderate damage); after 30 days, 100% of the beds are available.
    - All 17 schools are expected to lose at least one day of use; one school will likely experience at least moderate damage

These hurricane wind results show a decrease in the losses from high wind events between previous and current Hazus-MH results. The difference in results is most likely explained by incremental improvements in the Hazus-MH program over the last few years.

Earthquake

An earthquake scenario was developed using Hazus-MH that models a magnitude 6.4 earthquake with an epicenter 10 kilometers below East Haddam. The number of buildings estimated to be damaged and the resulting building-related economic losses are shown in **Table 4-186** and **Table 4-187.**

Table 4-186 Number of Buildings Damaged – West Haven

	Slight	Moderate	Extensive	Complete	Total
Count	2,303	853	174	28	3,358

Table 4-187 Building-Related Economic Losses – West Haven

	Residential	Commercial	Industrial	Others	Total
Losses	$101,100,000	$68,190,000	$17,050,000	$11,230,000	$197,580,000

Other modeled impacts of this event include:

- Essential Facilities:
  - No essential facilities experience at least moderate damage
  - No essential facilities experience loss of functionality greater than 50%
- Transportation Infrastructure:
  - Only 63 of 77 highway segments are more than 50% functional after one week; highway losses total $11.91 million
  - 11 of 12 railway segments are more than 50% functional after one week
  - 2 of 2 light rail segment are less than 50% functional for more than one week
  - Damages to bus facilities total $130,000
  - Damages to port facilities total $220,000
- Utilities:
  - Potable water pipelines: 135 leaks and 34 breaks. Total water system losses are $610,000
  - Wastewater pipelines: 97 leaks and 24 breaks, a loss of $3.94 million
  - Natural gas pipelines: 28 leaks and 7 breaks, a loss of $130,000
  - Damages to communication system facilities total $20,000
  - 5 households experience a loss of water service on day one; by day 3, service is restored
- Shelter: 254 households will be displaced, with 169 individuals seeking temporary shelter in public shelters
- 7 to 17 individuals may require hospitalization and 1 to 4 individuals may be killed, depending on the time of day the earthquake strikes

ANNUALIZED LOSS ESTIMATES

Table 4-188 shows annualized loss estimates (ALE) for each hazard. Estimates were derived from a number of sources, as described in the Methodology section, and included in column two of the table:

- NFIP: Historic flood insurance claims processed for the community
- PA: Historic Public Assistance grants awarded to the community
- State HMP: Localized estimates based on those presented in the 2014 Connecticut Hazard Mitigation Plan
- HAZUS: Hazus-MH results from modeling performed for this multi-jurisdictional plan
- State HAZUS: Hazus-MH results from modeling performed for the 2014 Connecticut Hazard Mitigation Plan

Hazus-MH results for flooding and earthquake hazards (as run for this multi-jurisdictional plan) were not able to be annualized, and so are not included in the table below.

Table 4-188 Annualized Loss Estimates by Hazard – West Haven

Hazard	Source	Annualized Loss Estimate
Flooding	NFIP	$124,140
	PA	$177,566
	State HMP	$12,551
Hurricane Wind	HAZUS	$1,813,146

Hazard	Source	Annualized Loss Estimate
Thunderstorm	PA	$88,783
	State HMP	$5,121
Tornado **Winter Storm** **Dam Failure**	State HMP	$534,421
	PA	$86,695
	State HMP	$397
	State HMP	$2,178
Wildfire	State HMP	$6,428
Earthquake	State HAZUS	$103,035

PROBLEM STATEMENTS—WEST HAVEN

Table 4-189 provides statements of particular interest with regard to primary hazards of concern, geographic areas of concern, and vulnerable community assets within the City of West Haven. If applicable, any noted potential solutions or mitigation actions are discussed with the problem statements.

Table 4-189 Problem Statements - West Haven

Primary Hazards of Concern	
Trees	Trees-related hazards are cited as the City's biggest concern, particularly the downing of electric and communication lines during hurricane/tropical storm and severe winter storm events.
Urban flooding	Urban flooding is also a widespread concern, with major stormwater drainage issues in many localized areas across the City that are exacerbated by riverine and coastal sources of flood inundation along much of the City's borders, and backflow from existing stormwater systems caused by bottlenecks and inadequate detention/retention areas.
	Potential solutions/mitigation actions: update stormwater management / master drainage study and plan
Coastal flooding	Coastal flooding (storm-related and often resulting from high tides) and sea level rise.
Coastal Erosion	Coastal Erosion – constant, recurring erosion along shoreline in addition to episodic storm events. Sand is replaced every year. Existing granite/rock structures along shoreline have exacerbated coastal erosion problems.
Snow Management	Snow Management – finding an adequate place to stage huge amounts of snow is a challenge. When the snow melts quickly it may flood an area, and may erode the surface it is placed on.
	Need to designate areas to stage snow.
Geographic Areas of Concern	
Morgan Lane @ Railroad Underpass	Morgan Lane @ Railroad Underpass (between Heffernan Drive and Island Lane, near Yale West) – frequent and severe flash flooding concern with one recorded fatality.
Allingtown area	Allingtown area (Route 1 @ Campbell Avenue, near University of New Haven) – very frequent urban flooding problems across area (2-3 times per year) caused by inadequate drainage, and backflow from existing stormwater system. Has resulted in flooding to dormitories, vehicles, etc.
West Main Street @ Painter Drive	West Main Street @ Painter Drive – urban flooding problems, even with minimal rainfall amounts (much of water comes down from Allington area). Some basement flooding reported in area.
	Potential solutions/mitigation actions: Elm Street drainage project was designed to alleviate some problems, but hasn't fully done so.
West Spring Street	West Spring Street (near VA hospital campus) – area experiences velocity flooding caused by runoff from Veterans Affairs (VA) Hospital site, with impacts to public

	housing. Problems could get worse with potential paving of adjacent park (major concern for City). Cove River runs between West Spring Street and Coleman Street.
Campbell Avenue and Washington Avenue at Railroad Underpasses	Campbell Avenue and Washington Avenue at Railroad Underpasses; Elm Street – area subject to roadway and intersection flooding
Water Street Bulkhead	Water Street Bulkhead – ongoing project to extend the bulkhead, but not long enough to protect areas currently planned for future commercial development (brownfield site).
Ocean Avenue	Ocean Avenue (areas south of South Street) – significant concerns regarding coastal erosion (south of existing shoreline protection structures).
Area around 3rd Avenue Extension	Area around 3rd Avenue Extension (Morris Cove area) – this area includes Court Street, Peck Avenue, and the Old Field Creek floodplain and experiences repetitive residential flooding. There is also an old dump in this area.
Florida Section	Florida Section – has a significant stormwater flooding issue.
Vulnerable Community Assets	
Sewage Treatment Plant	Sewage Treatment Plant on Beach Street - located in floodplain, with history of frequent flooding issues at plant and flash flooding of access road. Area can become isolated after even 2-3" of rainfall.
	CDBG Grant has been awarded to elevate the roadway.
High school	High school grounds are in floodplain of Cove River, but building is not. Facility does not serve as shelter but does serve as a public health dispensing site and does house the City's mainframe computer systems.
	May move the City's mainframe.
Evacuation routes	Evacuation routes are threatened by flooding, which may quickly become impassable on short notice.
	Potential solutions/mitigation actions: Regional evacuation study or plan could address deficiencies in system; must be coordinated with surrounding jurisdictions and State.
Surfside Senior Housing	Surfside Senior Housing (200 Oak Street) – located along coast and has required mandatory evacuation during past storms.
Morrissey Manor Senior Housing	Morrissey Manor Senior Housing (Bayshore Drive) –located along coast and has required mandatory evacuation during past storms.
	Many critical facilities are within proximity to either a high hazard or a significant hazard dam. Further study is necessary to determine if a dam failure could potentially impact any of these facilities.
	Many critical facilities are in various storm surge inundation areas.
University of New Haven	University of New Haven has big problems with stormwater. There system can handle the water that is generated on their campus, however the water that flows downhill onto the campus overloads the system and causes flooding.
	A detention basin at the top of the hill would slow the flow of water onto the campus so it could handle the flow and Campbell Avenue would not flood.

WOODBRIDGE

CRITICAL FACILITIES – WOODBRIDGE

Table 4-190 contains a list of critical facilities provided by the Town of Woodbridge. These are depicted on Figure 4-90 along with FEMA flood zones.

Table 4-190 Critical Facilities - Woodbridge

Facility	Location	Emergency Power Supply?	Shelter?	In Floodplain or Coastal Flood Hazard Area?	In Surge Zones?
Emergency Services					
Fire Department	100 Center Road	Yes*	No	No	
Police Station	4 Meetinghouse Lane	Yes*	No	No	
Municipal Facilities					
Town Hall	11 Meetinghouse Lane	Yes*		No	No
DPW	15 Meetinghouse Lane	Yes*		No	No
Library	10 Newton Road	Yes*		No	No
Shelters					
Senior Center	4 Meetinghouse Lane	Yes*	Yes	No	No
High School	25 Newton Road	Yes*	Yes	No	No
Health Care and Senior Living Facilities					
Brookdale Extended Care Facility	330 Amity Road	Yes		No	No
Water and Wastewater					
RWA Water Treatment Plant	2035 Litchfield Turnpike	Yes		No	No
GNHWPCA Sewer Pump Station	66 Ansonia Road	Yes	No	No	No

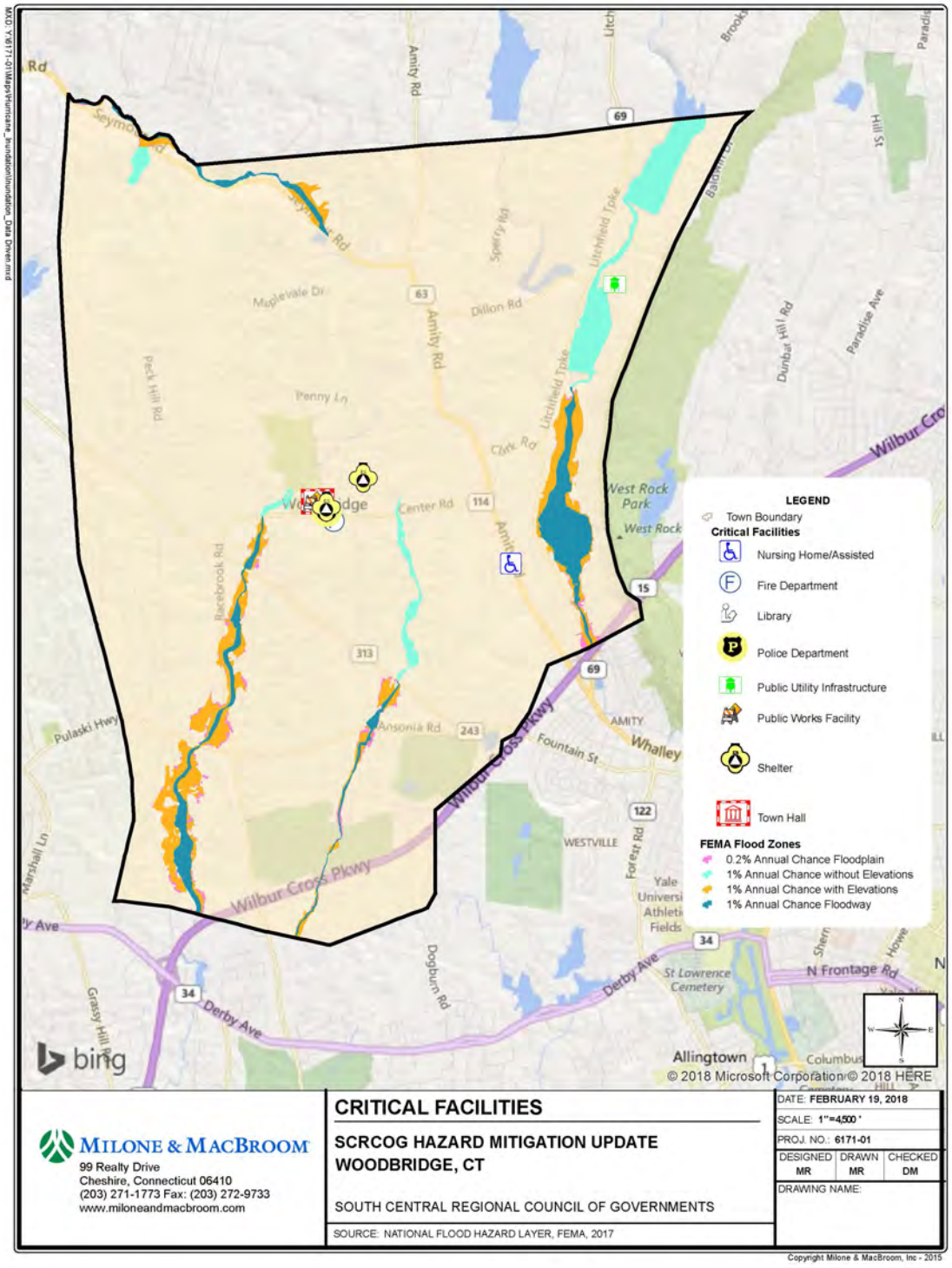


Figure 4-90 Critical Facilities and SFHA Map - Woodbridge

VULNERABLE ASSETS—WOODBRIDGE

Vulnerable assets were identified by intersecting GIS-based asset inventories and demographics data with known hazard boundaries to determine the numbers of parcels, buildings, critical facilities, historic assets, and populations exposed to each hazard. This results in an estimation of vulnerable assets by hazard as shown in **Table 4-191**. Figure 4-91 depicts the locations of historic resources.

Table 4-191 Vulnerable Assets by Hazard - Woodbridge[382]

Hazard	Number of Parcels[383]	Number of Buildings[384]	Critical Facilities[385]	Historic Assets[386]	Population[387]
Extreme Temperatures	3,606	4,117	9	65	8,990
Hurricane/Tropical Storm	3,606	4,117	9	65	8,990
Severe Thunderstorm	3,606	4,117	9	65	8,990
Severe Winter Storm/Nor'easter	3,606	4,117	9	65	8,990
Tornado	3,606	4,117	9	65	8,990
Dam Failure					
High Hazard (Class C)	332	357	0	13	921
Significant Hazard[388] (Class B)	N/A	N/A	N/A	N/A	N/A
Drought	3,606	4,117	9	65	8,990
Flood[389]					
1-Percent-Annual-Chance	299	59	0	0	152
0.2-Percent-Annual-Chance	173	29	0	0	72
Earthquake	3,606	4,117	9	65	8,990
Wildfire	2,854	2,895	0	26	7,469

[382] Potential Impacts are based on parcel exposure, not building exposure. It is possible for a historic asset or critical facility building to not be exposed, yet its associated parcel intersects a hazard area. The parcel value will then be reflected in the Potential Impacts Table.

[383] Based on data provided by the Town of East Haven.
[384] Based on building numbers from CT ECO.
[385] Based on a combination of data provided by the Town of East Haven and Hazus-MH.
[386] Data for historic assets was not available at the time of this analysis.
[387] Based on population numbers from 2010 census data.
[388] Dam failure inundation mapping was available for Class C dams. Inundation mapping was not available for other dams located in the town.
[389] Results for the flood hazard are not cumulative. Numbers and values of assets for events of increasing magnitude should be read as "in addition to" the preceding magnitudes.

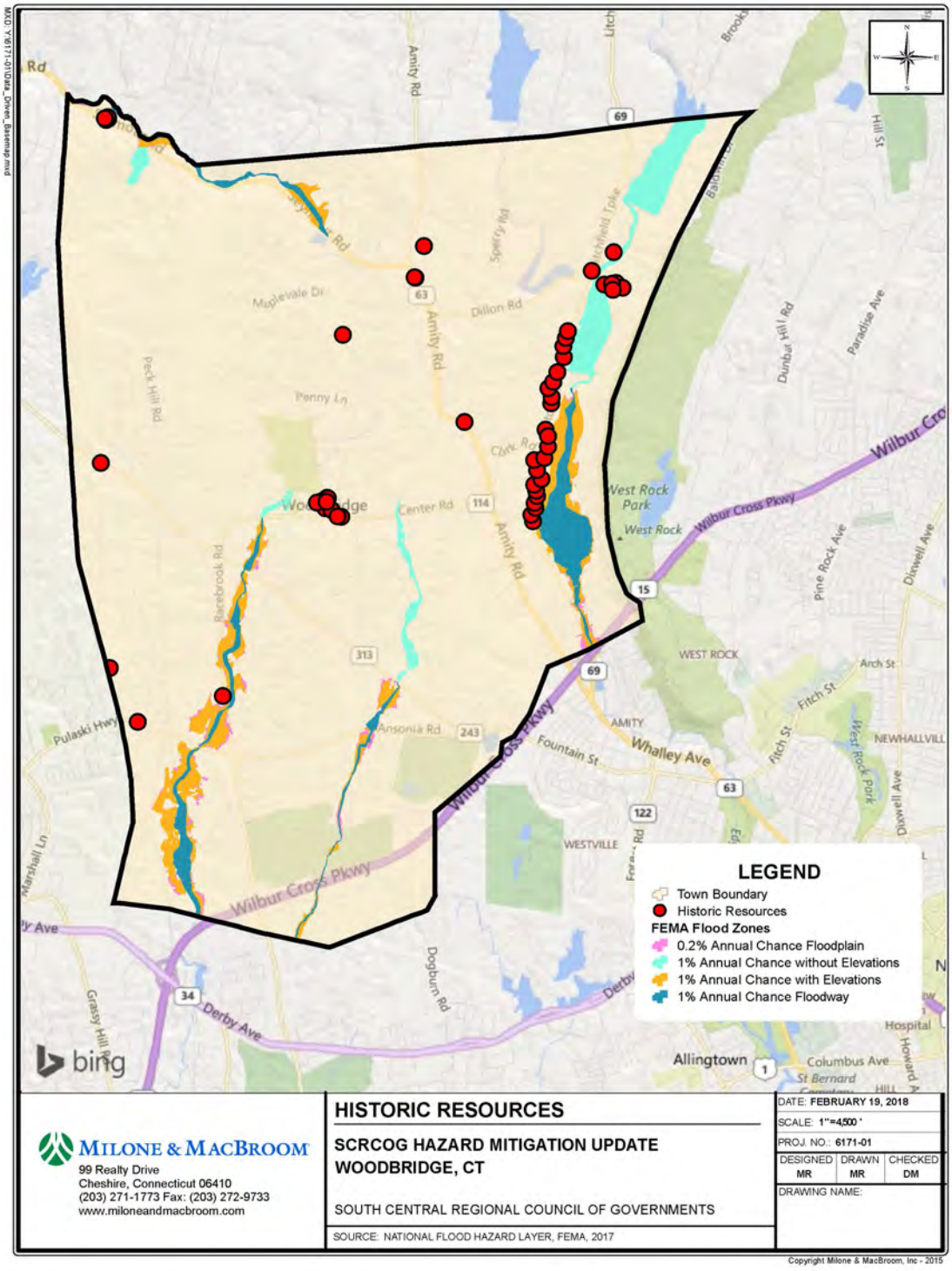


Figure 4-91 Historic Resources Map - Woodbridge

REPETITIVE LOSS AND SEVERE REPETITIVE LOSS PROPERTIES

In addition to the spatial analysis conducted above, summary information for repetitive flood loss and severe repetitive flood loss properties within the Town of Woodbridge also provides an indication of vulnerable assets, especially with regard to properties insured under the National Flood Insurance Program that have experienced repeated flooding (see Table 4-192).[390]

Table 4-192 Repetitive Flood Loss and Severe Repetitive Flood Loss Summary - Woodbridge

	Number of Losses	Number of Properties	Building Payments	Contents Payments	Total Payments
Repetitive Loss	27	7	$139,177	$80,994	$220,171
Severe Repetitive Loss	0	0	$0	$0	$0

The majority of the RL properties are single-family homes. Only one RL property is non-residential, and it appears to be commercial or industrial use.

As of December 31, 2012, the Town of Woodbridge had a total of 67 claims totaling $509,909 in losses for all NFIP-insured structures. By July 31, 2017, that number had grown to 69 claims totaling $509,909.

Figure 4-92 and **Figure 4-93** show dam and wildfire hazard areas within the Town of Woodbridge.

[390] Based on information provided by the Federal Emergency Management Agency current as of 11/30/2012.

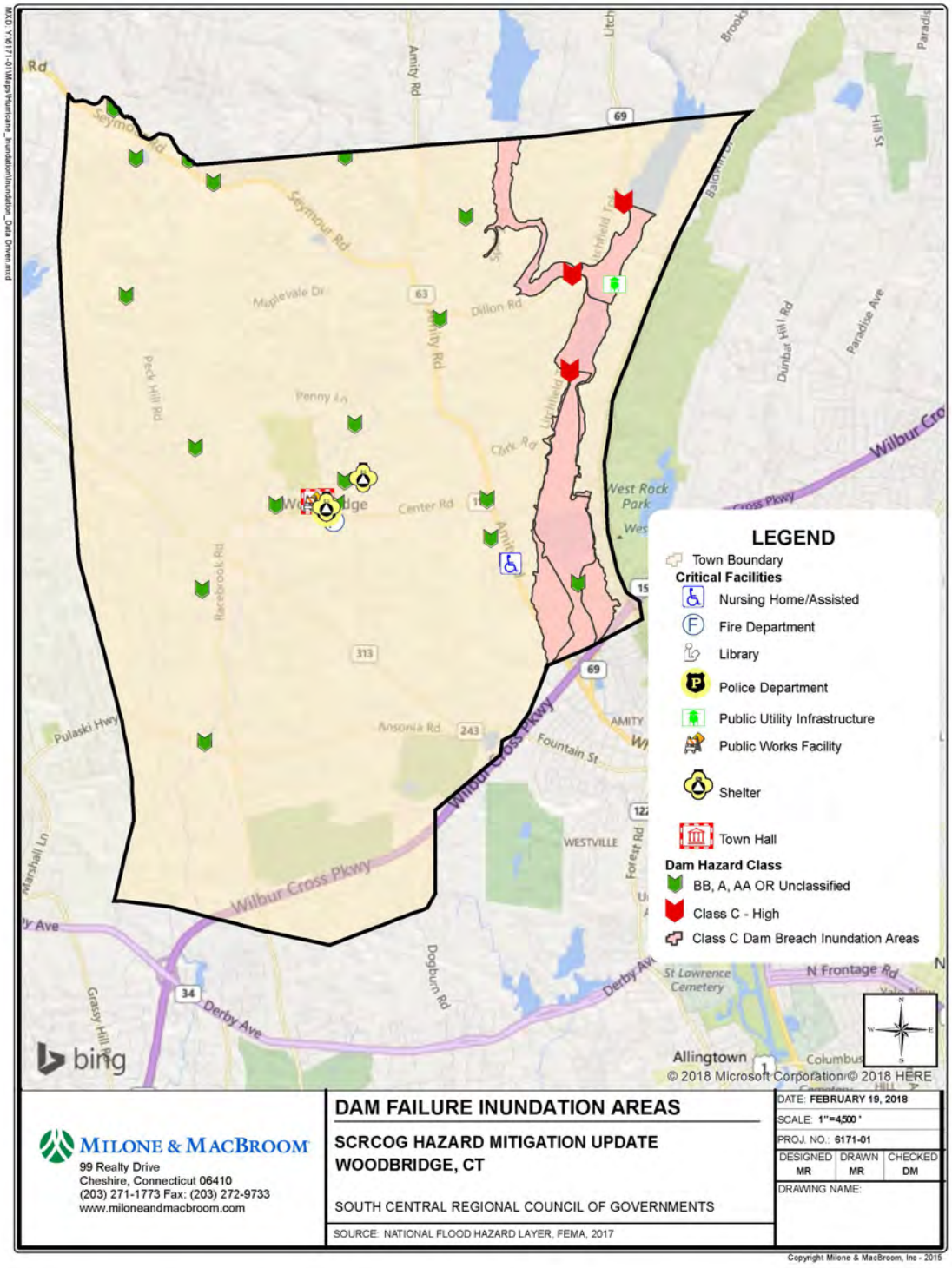


Figure 4-92 Dams Map - Woodbridge

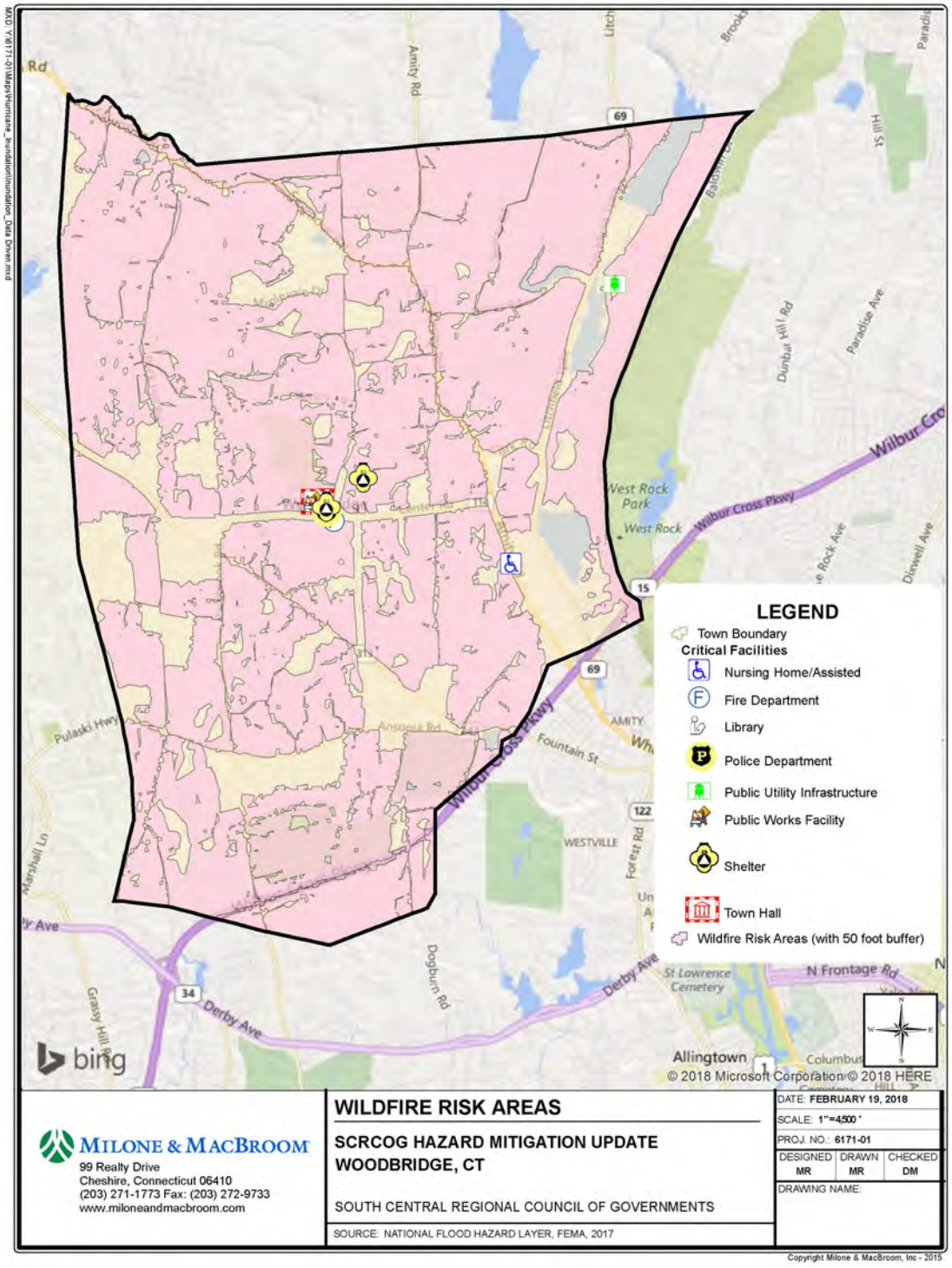


Figure 4-93 Wildfire Map - Woodbridge

POTENTIAL IMPACTS—WOODBRIDGE

Table 4-193 shows the total estimated value of improved parcels (parcels that contain at least one building), critical facilities, and historic assets that intersect with known hazard areas, as an indicator of the potential impacts should a hazard event occur.

Table 4-193 Potential Impacts by Hazard - Woodbridge

Hazard	Value of At-Risk Parcels[391]	Value of At-Risk Critical Facilities[392]	Value of At-Risk Historic Assets[393]
Extreme Temperatures	$1,597,692,770	$60,635,300	$37,350,500
Hurricane/Tropical Storm	$1,597,692,770	$60,635,300	$37,350,500
Severe Thunderstorm	$1,597,692,770	$60,635,300	$37,350,500
Severe Winter Storm/Nor'easter	$1,597,692,770	$60,635,300	$37,350,500
Tornado	$1,597,692,770	$60,635,300	$37,350,500
Dam Failure			
High Hazard (Class C)	$117,531,300	$11,042,800	$27,058,100
Significant Hazard[394] (Class B)	N/A	N/A	N/A
Drought	$1,597,692,770	$60,635,300	$37,350,500
Flood[395][396]			
1-Percent-Annual-Chance	$101,774,800	$17,564,500	$15,835,100
0.2-Percent-Annual-Chance	$54,337,700	$11,042,800	$12,166,600
Earthquake	$1,597,692,770	$60,635,300	$37,350,500
Wildfire	$624,094,400	$60,635,300	$37,051,100

LOSS ESTIMATES—WOODBRIDGE

DETAILED HAZUS-MH LOSS ESTIMATES

Riverine Flood

Estimated building losses for the riverine flood hazard generated by Hazus-MH are broken down into two categories: direct building losses and business interruption losses. The direct building losses are the estimated costs to repair or replace the damage caused to the building and its contents. The business interruption losses are the losses associated with the inability to operate a business because of the damage sustained during the flood.

[391] Based on data provided by the Town of Branford.
[392] Based on data provided by the Town of Branford.
[393] Based on data provided by the Town of Branford.
[394] Dam failure inundation mapping was available for Class C dams. Inundation mapping was not available for other dams located in the town.
[395] Results for the flood hazard are not cumulative. Numbers and values of assets for events of increasing magnitude should be read as "in addition to" the preceding magnitudes.
[396] Results for the hurricane inundation areas are cumulative. Numbers and values of assets for events of increasing magnitude should be read as "consisting of" the preceding magnitudes.

Business interruption losses also include the temporary living expenses for those people displaced from their homes because of the flood (see **Table 4-194**).

Table 4-194 Riverine Flood Loss Estimates (1-Percent-Annual-Chance Flood) - Woodbridge

	2014 Results Millions of Dollars					2017 Results Millions of Dollars				
	Residential	Commercial	Industrial	Others	Total	Residential	Commercial	Industrial	Others	Total
Direct Building Loss										
Building	$2.42	$0.86	$0.20	$0.30	$3.78	$1.73	$0.54	$0.05	$0.22	$2.54
Contents	$1.40	$2.22	$0.46	$0.98	$5.07	$0.72	$2.24	$0.11	$0.89	$3.96
Inventory	$0	$0.02	$0.06	$0.12	$0.19	$0.00	$0.00	$0.01	$0.09	$0.09
Subtotal	**$3.82**	**$3.10**	**$0.72**	**$1.40**	**$9.04**	$2.45	$2.78	$0.16	$1.20	$6.59
Business Interruption										
Income	$0	$0.03	$0	$0	$0.03	$0.00	$0.02	$0.00	$0.00	$0.02
Relocation	$0	$0	$0	$0	$0	$0.00	$0.00	$0.00	$0.00	$0.00
Rental Income	$0	$0	$0	$0	$0	$0.00	$0.00	$0.00	$0.00	$0.00
Wage	$0	$0.02	$0	$0.01	$0.02	$0.00	$0.02	$0.00	$0.00	$0.02
Subtotal	**$0**	**$0.05**	**$0**	**$0.01**	**$0.05**	$0.00	$0.04	$0.00	$0.00	$0.05
TOTAL	**$3.82**	**$3.15**	**$0.72**	**$1.41**	**$9.10**	$2.45	$2.82	$0.16	$1.20	$6.63

In addition, the Hazus-MH model estimates 47 households will be displaced due to the flood. Displacement includes households evacuated from within or very near to the inundated area. Of these, 46 people will seek temporary shelter in public shelters.

One school is expected to sustain at least moderate damage.

These inland flooding results show a minor decrease in the estimated losses from a 1% annual-chance flood between the previous and the current Hazus-MH results. The difference in results is most likely explained by incremental improvements in the Hazus-MH program over the last few years.

Hurricane Wind

Hazus-MH was used to model probabilistic hurricane wind impacts for the 10-, 20-, 50-, 100-, 200-, 500- and 1,000-year events. These annualized return periods compare to the Saffir-Simpson Scale in the following way:

- 10-year Tropical Depression/Tropical Storm
- 20-year Tropical Storm
- 50-year Tropical Storm/Category 1
- 100-year Category 1/Category 2
- 200-year Category 2
- 500-year Category 3
- 1000-year Category 3

The number of buildings estimated to be damaged and the resulting building-related economic losses are shown in **Table 4-196, Table 4-197,** and **Table 5-206.**

Table 4-195 Number of Buildings Damaged - Woodbridge

	Return Period	Minor	Moderate	Severe	Destruction	Total
2014 Results	10-year	0	0	0	0	0
	20-year	2	0	0	0	2
	50-year	26	1	0	0	27
	100-year	184	13	0	0	197
	200-year	501	65	3	1	570
	500-year	1,043	283	32	15	1,373
	1,000-year	1,299	547	114	60	2,020
2017 Results	10-year	0	0	0	0	0
	20-year	0	0	0	0	0
	50-year	8	0	0	0	8
	100-year	59	3	0	0	62
	200-year	188	14	0	0	202
	500-year	525	70	3	1	599
	1,000-year	807	152	10	4	973

Table 4-196 Building-Related Economic Losses - Woodbridge

	Return Period	Minor	Moderate	Severe	Destruction	Total
2014 Results	10-year	$0	$0	$0	$0	$0
	20-year	$3,700	$0	$0	$0	$3,700
	50-year	$1,418,820	$52,340	$5,540	$12,060	$1,488,760
	100-year	$4,703,540	$342,540	$37,180	$102,810	$5,186,070
	200-year	$11,676,180	$1,403,340	$181,440	$469,680	$13,730,640
	500-year	$41,904,580	$5,003,870	$860,010	$1,613,890	$49,382,350
	1,000-year	$97,475,380	$11,850,480	$2,143,410	$3,098,930	$114,568,200
2017 Results	10-year	$0	$0	$0	$0	$0
	20-year	$0	$0	$0	$0	$0
	50-year	$859,690	$25,850	$3,720	$5,540	$894,790
	100-year	$3,429,940	$141,340	$16,140	$30,260	$3,617,680
	200-year	$6,830,870	$456,310	$50,910	$132,60	$7,470,700
	500-year	$17,338,350	$1,896,260	$259,140	$628,990	$20,122,740
	1,000-year	$32,326,230	$3,428,570	$559,590	$1,189,530	$37,503,920

Table 4-197 Other Hurricane Impacts - Woodbridge

Return Period	Debris Generated (Tons)	Households Displaced	Individuals Seeking Temporary Shelter
10-year	0	0	0
20-year	0	0	0
50-year	33	0	0
100-year	3,718	0	0
200-year	6,683	1	0
500-year	10,870	6	1
1,000-year	19,312	16	3

Other modeled impacts of this event include the following effects on essential facilities:

- After a 1,000-year hurricane, all 5 schools are expected to lose at least one day of use
- This is based on HAZUS-MH data. Woodbridge has 2 public schools and 1 private school. The data may look at different school buildings as independent schools.

These hurricane wind results show a decrease in the losses from high wind events between previous and current Hazus-MH results. The difference in results is most likely explained by incremental improvements in the Hazus-MH program over the last few years.

Earthquake

An earthquake scenario was developed using Hazus-MH that models a magnitude 6.4 earthquake with an epicenter 10 kilometers below East Haddam. The number of buildings estimated to be damaged and the resulting building-related economic losses are shown in Table 4-198 and Table 4-199.

Table 4-198 Number of Buildings Damaged - Woodbridge

	Slight	Moderate	Extensive	Complete	Total
Count	551	189	37	6	783

Table 4-199 Building-Related Economic Losses - Woodbridge

	Residential	Commercial	Industrial	Others	Total
Losses	$22,890,000	$20,860,000	$2,320,000	$3,760,000	$49,830,000

Other modeled impacts of this event include:

- Essential Facilities:
  - No essential facilities experience at least moderate damage
  - Following the event, no essential facilities are likely to lose functionality
- Transportation Infrastructure:
  - Only 30 of 40 highway segments are more than 50% functional after one week; all 10 highway bridges remain functional on day 1; total losses are $90,000
  - Note: The Town is concerned about the accuracy of the number of highway segments and bridges, the analysis was run using Hazus-MH data sets.
- Utilities:
  - Potable water pipelines: 24 leaks and 6 breaks. Total water system losses are $1.93 million
  - Wastewater pipelines: 17 leaks and 4 breaks, a loss of $80,000
  - Natural gas pipelines: 5 leaks and 1 breaks, a loss of $20,000
  - No loss of utility service is expected
- Shelter: 13 household will be displaced, with 6 individuals seeking temporary shelter in public shelters
- 1 to 3 individuals may require hospitalization and 0 to 1 individuals may be killed, depending on the time of day the earthquake strikes.

ANNUALIZED LOSS ESTIMATES

Table 4-200 shows annualized loss estimates (ALE) for each hazard. Estimates were derived from a number of sources, as described in the Methodology section, and included in column two of the table:

- NFIP: Historic flood insurance claims processed for the community
- PA: Historic Public Assistance grants awarded to the community
- State HMP: Localized estimates based on those presented in the 2014 Connecticut Hazard Mitigation Plan
- HAZUS: Hazus-MH results from modeling performed for this multi-jurisdictional plan
- State HAZUS: Hazus-MH results from modeling performed for the 2014 Connecticut Hazard Mitigation Plan

Hazus-MH results for flooding and earthquake hazards (as run for this multi-jurisdictional plan) were not able to be annualized, and so are not included in the table below.

Table 4-200 Annualized Loss Estimates by Hazard – Woodbridge

Hazard	Source	2018 HMP ALE
Flooding	NFIP	$13,075
	PA	$29,430
	State HMP	$2,070
Hurricane Wind Thunderstorm	HAZUS	$171,413
	PA	$14,715
	State HMP	$844
Tornado Winter Storm Dam Failure	State HMP	$88,129
	PA	$42,725
	State HMP	$65
	State HMP	$359
Wildfire	State HMP	$11,241
Earthquake	State HAZUS	$16,991

PROBLEM STATEMENTS—WOODBRIDGE

Table 4-201 provides statements of particular interest with regard to primary hazards of concern, geographic areas of concern, and vulnerable community assets within the Town of Woodbridge. If applicable, any noted potential solutions or mitigation actions are discussed with the problem statements.

Table 4-201 Problem Statements - Woodbridge

Primary Hazards of Concern	
Trees	**Trees** –The town has inadequate equipment and funding to manage tree removal for the large number of diseased trees. The electric company is helping with the side of the road that has electrical wires on all state roads but local roads remain a problem.
Hurricane/tropical storm, and severe winter storm/nor'easter	Atmospheric hazards are of greatest concern to the Town, especially **hurricane/tropical storm**, and **severe winter storm/nor'easter** – A microgrid has been installed to power all critical facilities. Power Outages remain a significant threat to homeowners who do not have generators.
Riverine flood	**Riverine flood** is also a significant concern in localized areas – mostly occurs along private property, developed prior to floodplain mapping and Town floodplain

	management regulations. Occasional isolation of some residential properties can be problematic.
Wildfire	**Wildfire** is a moderate hazard of concern, as the Town owns 1,000+ acres of open land but maintains aggressive fuels management program and most fires are quickly identified and contained or suppressed.
	Potential solutions/mitigation actions: bolster wildfire planning efforts for periods of extreme drought
Geographic Areas of Concern	
Litchfield Turnpike (Route 69) @ Warren Road	**Litchfield Turnpike (Route 69) @ Warren Road** – floodwaters from Konolds Pond reach roadway during severe rainfall events. Approximately 5 residential properties are considered by Town to be potentially at risk. The Bradley Road Bridge was replaced but the change is only 3" and that is not enough to decrease flooding.
	Potential solutions/mitigation actions: sediment removal from lake to increase storage capacity.
Litchfield Turnpike @ Bradley Road	**Litchfield Turnpike @ Bradley Road** (West River Bridge) – area experiences velocity flows and flooding along West River, upstream and downstream of bridge. This is home to residential and commercial properties. The Pond Lily Dam was removed to help alleviate this problem.
	Potential solutions/mitigation actions: channel improvements and removal of downstream Pond Lily Dam at Lily Pond in New Haven should alleviate flooding. The Town of Woodbridge has completed studies and has received grant funding to support the design of the dam removal project, which is being done for flood mitigation and habitat restoration purposes. The Connecticut Fund for the Environment has assumed a leadership role in the final design and permitting study, which is nearly complete. The Town is also working with the New Haven Land Trust, American Rivers, Solar Youth, and other non-profit organizations in addition to CT DEEP's Bureau of Natural Resources on the project.
Litchfield Turnpike @ Lucy Street / Merritt Avenue	**Litchfield Turnpike @ Lucy Street / Merritt Avenue** – ~~Merritt Avenue Bridge replacement has created flooding problems along the West River at 10+ year return period event.~~ Several homes have experienced minor flooding in this area, north and south of the Merritt Parkway, and some businesses have been impacted. Scouring at bridge site has also been reported.
	Potential solutions/mitigation actions:
	Channel improvements and removal of downstream Pond Lily Dam at Lily Pond in New Haven (described above) should alleviate flooding.
	Routine sediment control and debris removal at bridge.
Seymour Road	**Seymour Road** area in far northwest area of town (at confluence of Bladens River and Black Brook) – experiences occasional nuisance flooding to roads in low-density residential area. No structural flood damages reported. The State removed beavers that may have caused flooding in this area but flooding still seems to be a problem.
West Rock Ridge State Park	**West Rock Ridge State Park** – area of concern for wildfire ignitions (campers/hikers may start fires here)**.**
Vulnerable Community Assets	
	Shelters – Senior Center is a shelter.
Animal Control Facility	Animal Control Facility – this facility is in the flood zone and it is expanding. It is located near the dam on Bradley Road.
Telephone communications	Telephone communications – land lines and cellular towers are vulnerable to wind/tree damage and have gone down in the past, leaving the Town without good ways to communicate with residents (used pamphlets after recent storms).
Extended Care Facility	1 of 3 extended care facilities does not have backup generator power (Emeritus at Woodbridge).
Lilly Pond Dam	Lilly Pond Dam – partially removed. There has not been enough rainfall to judge the impact of the partial dam removal on flooding. The dam was lowered six feet.
	One critical facility is within proximity to a high hazard dam. Further study is necessary to determine if a dam failure could potentially impact any of these facilities.

	One critical facility is in the 1-percent-annual-chance floodplain.

CHANGES SINCE 2014

- The library may still be used as a warming station, meeting area or as a place to charge cell phones. It is not considered a vulnerable asset since it relies on the microgrid for back-up power.
- The Merritt Avenue Bridge was replaced to convey increased water flows along the West River.

CONCLUSIONS ON HAZARD RISK

The vulnerability assessments completed for each participating jurisdiction include both quantitative and qualitative information to help determine the potential impact of each identified hazard on community assets. These findings were used in combination with the information included in the *Hazard Analysis* section to prioritize hazard risks for the South Central Region during development of the initial plan.

To assist in this process, the Advisory Committee developed and applied a "Priority Risk Index" (PRI). The PRI is a tool designed to (1) summarize relevant hazard profile information and (2) measure the degree of relative risk each hazard poses to the planning area based on that information. The PRI was used to assist the Advisory Committee in ranking and prioritizing hazards based on a variety of characteristics including location, probability, potential impact, warning time, and duration.

The PRI resulted in numerical values that allow identified hazards to be ranked against one another – the higher the PRI value, the greater the hazard risk. PRI values were obtained by assigning varying degrees of risk to each of the five characteristics, or categories. Each degree of risk was assigned an index value (1 to 4) and an agreed upon weighting factor, as summarized in **Table 4-202.**

To calculate the PRI value for a given hazard, the assigned index value for each category is multiplied by the weighting factor. The sum of all five categories equals the final PRI value, as demonstrated in the below equation:

PRI VALUE = (LOCATION x .20) + (PROBABILITY x .30) + (POTENTIAL IMPACT x .30) + (WARNING TIME x .10) + (DURATION x .10)

According to the weighting scheme applied for the South Central Region, the highest possible PRI value is 4.0. Prior to being finalized, PRI values for each hazard were reviewed and accepted by the Advisory Committee.

Table 4-202 Priority Risk Index

PRI Category	DEGREE OF RISK			Assigned Weighing Factor
	Level	Criteria	Index Value	
Location	Negligible	Less than 1% of planning area affected	1	20%
	Small	1-10% of planning area affected	2	
	Moderate	10-50% of planning area affected	3	
	Large	50-100% of planning area affected	4	
Probability	Unlikely	Less than 1% annual probability	1	30%

	Occasional	1-10% annual probability	2	
	Likely	10-90% annual probability	3	
	Highly Likely	90-100% annual probability	4	
Potential Impact *	Minor	Very few injuries, if any. Only minor property damage and minimal disruption to quality of life. Partial or complete shutdown of critical facilities for less than one day.	1	30%
	Limited	Minor injuries only. 10-25% of property in affected area damaged or destroyed. Complete shutdown of critical facilities for more than one day.	2	
	Critical	Multiple fatalities/injuries possible. More than 25% of property in affected area damaged or destroyed. Complete shutdown of critical facilities for more than one week.	3	
	Catastrophic	High number of fatalities/injuries possible. More than 50% of property in affected area damaged or destroyed. Complete shutdown of critical facilities for more than one month.	4	
Warning Time	More than 24 hours		1	10%
	12 to 24 hours		2	
	6 to 12 hours		3	
	Less than 6 hours		4	
Duration	Less than 6 hours		1	10%
	6 to 24 hours		2	
	1 to 7 days		3	
	More than 1 week		4	

* Potential impact was based upon the estimated *maximum probable extent* (magnitude/severity) for each hazard based on historic events or future probability data, as shown in **Table 4-203.**

Table 4-203 Estimated Maximum Probable Extent

Hazard	Maximum Probable Extent
Extreme Temperatures	5 consecutive days with a heat index exceeding 100° or wind chill of less than 20°
Hurricane/Tropical Storm	Category 3 hurricane on Saffir-Simpson Hurricane Wind Scale
Severe Thunderstorm	Winds gusts in excess of 50 knots, hail measuring at least three-quarters of an inch in diameter, or tornado occurrence
Severe Winter Storm/Nor'easter	Intensity Index Category 3 on Classification Scale for Severe Winter Storms/Nor'easters
Tornado	EF-3 Rating on Enhanced Fujita Scale
Coastal Erosion	Long-term erosion rate of 2+ feet per year
Dam Failure	Complete failure of high hazard dam (Class C)
Drought	PDSI Value of -4.0 (Extreme Drought) on Palmer Drought Severity Index
Flood (3 Types):	
Riverine Flood	1 Percent Annual Chance Flood for all inland FEMA Special Flood Hazard Areas
Coastal Flood	Worst Case Storm Surge Inundation for Category 2 Hurricane
Urban Flood	10-year Design Storm Event
Sea Level Rise	1-meter SLR scenario for 2080s, no storm, medium inundation zone as mapped by The Nature Conservancy
Earthquake	Intensity VII on Modified Mercalli Intensity scale
Wildfire	100 acres burned along urban/wildland interface

Table 4-204 summarizes the degree of risk assigned for all identified hazards in the South Central Region based on the application of the PRI tool, along with the calculated PRI values.

Table 4-204 Summary of PRI Results

Hazard	Category / Degree of Risk					
	Location	Probability	Potential Impact*	Warning Time	Duration	PRI score
Extreme Temperatures	Large	Likely	Minor	More than 24 hours	1 to 7 days	**2.4**
Hurricane/Tropical Storm	Large	Likely	Catastrophic	More than 24 hours	6 to 24 hours	**3.2**
Severe Thunderstorm	Small	Highly Likely	Minor	Less than 6 hours	Less than 6 hours	**2.4**
Severe Winter Storm/Nor'easter	Large	Highly Likely	Critical	More than 24 hours	1 to 7 days	**3.3**
Tornado	Small	Occasional	Catastrophic	Less than 6 hours	Less than 6 hours	**2.7**
Coastal Erosion	Small	Highly Likely	Limited	More than 24 hours	More than 1 week	**2.7**
Dam Failure	Small	Unlikely	Critical	Less than 6 hours	6 to 24 hours	**2.2**
Drought	Large	Occasional	Minor	More than 24 hours	More than 1 week	**2.2**
Flood (3 Types):						
Riverine Flood	Moderate	Occasional	Catastrophic	More than 24 hours	1 to 7 days	**2.8**
Coastal Flood	Moderate	Likely	Catastrophic	More than 24 hours	6 to 24 hours	**3.0**
Urban Flood	Small	Highly Likely	Minor	Less than 6 hours	Less than 6 hours	**2.4**
Sea Level Rise	Small	Highly Likely	Limited	More than 24 hours	More than 1 week	**2.7**
Earthquake	Large	Occasional	Minor	Less than 6 hours	Less than 6 hours	**2.2**
Wildfire	Negligible	Highly Likely	Minor	Less than 6 hours	6 to 24 hours	**2.3**

The calculated PRI values were used to classify each hazard according to three defined risk levels (low, moderate, or high) as shown in

Table 4-205. It should be noted that although some hazards are classified as posing "low" risk, their occurrence of varying or unprecedented magnitudes is still possible and will continue to be evaluated by each participating jurisdiction and during future plan updates.

Table 4-205 Conclusions on Hazard Risk

High Hazards	Severe Winter Storm/Nor'easter Hurricane/Tropical Storm Coastal Flood Riverine Flood
Moderate Hazards	Tornado Coastal Erosion Sea Level Rise Extreme Temperatures Severe Thunderstorm Urban Flood
Low Hazards	Wildfire Dam Failure Drought Earthquake

The PRI values risk levels were reviewed in the process of updating the hazard mitigation plan, and they were deemed appropriate and held constant, even with the different data sets available for this update (such as the shoreline change atlas erosion data and CIRCA's sea level rise projections).

CHAPTER 5. CAPABILITY ASSESSMENT

C1. Does the plan document each jurisdiction's existing authorities, policies, programs and resources and its ability to expand on and improve these existing policies and programs? FEMA Requirement §201.6(c)(3)

The purpose of conducting the capability assessment is to identify the strengths, weaknesses, gaps and opportunities for local governments within the planning area in terms of mitigating risks. The capability assessment serves as the foundation for designing an effective hazard mitigation strategy. It not only helps establish the goals for the mitigation plan, but it ensures that those goals are realistically achievable under given local conditions.

The capability assessment must answer two questions:

1. Does the Plan document each jurisdiction's existing authorities, policies, programs and resources, and its ability to expand on and improve these existing policies and programs?[397]
2. Does the Plan address each jurisdiction's participation in the NFIP and continued compliance with NFIP requirements, as appropriate?[398]

The capability assessment includes a comprehensive examination of the following capabilities as summarized below0:

- **Planning and Regulatory Capabilities**
  - Does the jurisdiction have plans in place that include natural hazards? Do the plans identify mitigation projects? Can the plan be used to implement mitigation actions?
- **Administrative and Technical Capabilities**
  - What skills does the jurisdiction have and can they be used for mitigation planning?
- **NFIP Participation**
  - What is the level of participation in each jurisdiction?
- **Financial Capabilities**
  - Is the jurisdiction eligible for or have access to funding sources for hazard mitigation?
- **Education and Outreach Capabilities**
  - What education and outreach programs are currently in place to communicate hazard-related information?
- **Safe Growth Analysis**
  - Evaluates the extent to which each jurisdiction is positioned to grow safely relative to its natural hazards. Included are the following topic areas: Land Use; Transportation; Environmental Management; Public Safety; Zoning Ordinance; Subdivision Regulations; and Capital Improvement Program and Infrastructure Policies.

[397] 44 CFR 201.6(c)(3)
[398] 44 CFR 201.6(c)(3)(ii)

REVIEW AND INCORPORATION OF EXISTING PLANS

A4. Does the Plan describe the] review and incorporation of existing plans, studies, reports, and technical information. FEMA Requirement §201.6(b)(3)

The first step in the capability assessment was to gather and review existing plans to gain an understanding of the jurisdiction's ability to mitigate risk.

Connecticut's 2014 Natural Hazards Mitigation Plan Update

The State of Connecticut, Department of Energy and Environmental Protection, with assistance from the Department of Emergency Services and Public Protection (Division of Emergency Management and Homeland Security), prepared the 2014 state level Natural Hazard Mitigation Plan as an update to the earlier 2010 plan. This Plan Update was thoroughly reviewed to ensure consistency with this regional plan. For example, the State's primary mitigation goal statements were reviewed and considered by the Advisory Committee during the review and discussion on updating their own goals for the regional plan. In addition, the State's Natural Hazard Identification and Risk Assessment was reviewed for notable updates and content that could help inform updates to the risk assessment for the South Central region. It was recognized that the State continued to place more emphasis on the inclusion of climate change as a key concern and as an amplifier of natural hazards, something that has been replicated in this Plan.

SCRCOG Jurisdiction Hazard Mitigation Plans

Six jurisdictions within the SCRCOG region have previously developed local hazard mitigation plans. The City of Meriden has prepared and maintains its own plan, though the SCRCOG's vision is to create one fifteen-jurisdiction multi-jurisdiction plan during the next update to this plan. Each of the following plans were reviewed and incorporated into this multi-jurisdiction plan.

1. Town of East Haven Hazard Mitigation Plan Update 2012, Town of East Haven, CT, May 1, 2012
2. Town of Guilford Natural Hazard Mitigation Plan, Town of Guilford, CT, June 4, 2012
3. Hazard Mitigation Plan Update, City of Milford, CT, August 12, 2013
4. City of New Haven Natural Hazard Mitigation Plan Update II, City of New Haven, CT, April 14, 2017

Revised Draft of the 2018-2023 Conservation and Development Policies Plan for Connecticut, May 12, 2017

Review of this updated draft plan indicates the mitigation plan still aligns with the priorities of the state. Two of the six growth management principles in this draft plan directly relate to mitigation and risk management, as follows:

1. Conserve and restore the natural environment, cultural and historic resources, and traditional rural lands.
2. Protect and ensure the integrity of environmental assets critical to public health and safety.

South Central Region: Plan of Conservation and Development, SCRCOG, July 2009

The South Central Regional Plan of Conservation and Development is a general guide for land use conservation and development for the fifteen-jurisdiction region comprised of Bethany, Branford, East Haven, Guilford, Hamden, Madison, Meriden, Milford, New Haven, North Branford, North Haven, Orange, Wallingford, West Haven, and Woodbridge. The plan was developed and reviewed extensively with planning staff in each jurisdiction and by

each jurisdiction's representative to the Regional Planning Commission (RPC) in coordination with their chief elected officials. The plan is in the process of being updated, and will be completed in 2018. The plan is organized around three broad themes: the human environment, the natural environment, and the built environment. While these themes help to present the information and objectives of the region in a cohesive manner, no one theme operates independently of the others. The objectives in any one thematic area are intended to support the guiding vision and objectives of all three "environments' of the region. For the purposes of this mitigation plan, the latest draft plan available (October 2, 2017) was used for information regarding demographics, land use, transportation and general emergency management information.

The updated draft Plan of Conservation and Development supports the region's ability to reduce risks to natural hazards and now includes multiple cross references to the Regional Hazard Mitigation Plan. It has also integrated the notion of resilience across all three broad themes identified above. Per the current draft plan there is also an explicit goal focused on resilience with the following identified strategies:

1. Continue to update natural hazard mitigation plan for the region in a timely manner to prepare, adapt, and recover quickly from severe weather events by securing necessary federal and state grants for pre-/post-disaster mitigation.
2. Support and promote the education of regional residents and business-owners regarding projected changes to coastal lands and resources, and the need and basis for resiliency strategies.
3. Support and promote implementation of identified coastal resilience projects in the Region.
4. Ensure that regional transportation projects consider and incorporate science-based sea level rise and resiliency information, as much of the Region's critical infrastructure is located along the coast.
5. Promote effective stormwater management strategies such as, adoption of green regulations and practices, to reduce runoff from impervious surfaces and minimize flooding; increase the capacity of drainage systems through sewer separation in areas with combined sewers; promote low impact developments.
6. Educate communities on the financial benefits of FEMA's Community Rating System program and assist them in participating in the program.
7. Collaborate with partners within and outside the region, including neighboring regions to provide and seek technical assistance, to avoid duplication of efforts, and to develop a coordinated response for dealing with natural disasters.

Plans of Conservation and Development

Connecticut General Statutes set forth required procedures by which each jurisdiction must prepare or amend and adopt a plan of conservation and development (POCD). In Connecticut, POCDs are essentially the local jurisdiction's master or comprehensive plan – a long-range, visionary and policy document to guide how the community wants to develop over the next 10 years, and it supports local decision making in areas such as natural resources preservation, economic development, housing, land use, and public services. All POCDs for participating jurisdictions were reviewed during the plan update process to ensure general consistency and integration as appropriate. Information particularly relevant to the mitigation plan is included in the following list.

1. Town Plan of Conservation and Development for Bethany, Connecticut (2010)
    - Among the plan's guiding principles, the Town seeks to "ensure orderly development that is in harmony with Bethany's unique natural environment…" (p. 9)

- Under the plan's Open Space Measures, the Town has identified that it will "Incorporate Low Impact Design standards into planning and zoning regulations to prevent the concentration of storm-water drainage and encourage natural infiltration whenever possible." (p. 20)
- Under the plan's Road and Transportation Policies, the Town has stated that "the design and engineering of new roads and rebuilding and maintenance of existing roads shall be guided by the principles and techniques of Low Impact Development (LID)," and includes a more descriptive sidebar on LID. (p. 23)
- Under the plan's Development Measures, the Town has identified that it will "Adopt policies and regulations for sustainable, natural storm-water drainage to minimize runoff and maximize on-site drainage of storm-water, as opposed to simply discharging it into a storm-water drainage system, which would carry it off-site." (p. 32)

2. Branford's Window to the Future, 2008 Plan of Conservation and Development (2008)

- The plan includes several areas that are especially relevant to the mitigation plan; including sea level rise preparation, stormwater management and flooding. It mentions how sea level rise will increase flooding and may impact emergency services. The named action is "*be cognizant and vigilant about how global sea level rise may affect existing and future development in coastal areas*." (p. 23)
- To address stormwater the plan calls for continued "*resources (time and money) to addressing and managing drainage issues*." (p. 88)
- The flooding section is more detailed. It specifically names Meadow Street, Totoket Road, and Briarwood Lane as areas of concern. The plan also mentions considering participation in the Community Rating System (CRS) program to access credit for floodplain management. (p. 89)

3. Plan of Conservation and Development, Town of East Haven, Connecticut (2007)

- Among the policies established under the plan's Environmental Preservation element is "Minimize the potential for loss of life or property due to flooding by carefully controlling and limiting development in designated flood prone areas." (p. 10). Multiple strategies to address periodic flooding are included in this element, in addition to recognition that "solutions to drainage problems should be on a basin-wide basis, through cooperation between the municipalities that share the drainage basin." (p.11)
- The plan specifically addresses coastal hazard mitigation by stating that "new development should be strongly discouraged in these [coastal hazard] areas," and that "the prevention of coastal flooding and damage should be accomplished primarily through the prevention of substandard development, instead of expensive and complicated flood control projects." (p. 12)
- Coastal hazard mitigation is also addressed in the plan's Special Study Area chapter for the Shoreline Area which states "development within most of the coastal hazard area should be discouraged through adoption of zoning regulations that limit the permitted intensity of development," and that "many of these areas would be appropriate for park and open space use." (p. 78)
- The plan establishes "Prevention of damage from flooding" as an environmental objective under the plan's Open Space element. (p. 42).
- Under the plan's Other Land Use Recommendations, the Town proposes that "no additional development should occur within the Farm River floodplain." (p. 86)

4. Guilford Plan of Conservation and Development Update (2015)

- Under the Plan's Strategies and Actions for Goal 2 (Conserve Guilford's Lands, Waters, and Natural Areas), the plan proposes to "*Incorporate Municipal Coastal Plan, Hazard Mitigation Plan, and Community Coastal Resiliency Plan into land use policies,*" explaining that doing so will provide consistency in land use between plans, and that recommendations from these plans are aimed at "*making Guilford resilient and adaptive to the effects of sea level rise and coastal storms.*" (p. 24)
- The plan's Action Agenda includes many actions in support of hazard mitigation, including but not limited to the following:
    1. Transportation 1.5: Consider the effects of climate change and sea level rise, especially those in the Hazard Mitigation and Coastal Resiliency Plans, and assess appropriate resilience measures to mitigate their effect on critical infrastructure.
    2. Resources 5.1: Pursue recommendations for specific hard shoreline/structural measures, such as beach nourishment, wave attenuation structures, and maintaining or upgrading existing hard structures for property protection where appropriate.
    3. Resources 5.2: Pursue the use of living shoreline protective measures where appropriate. The Community Coastal Resilience Plan suggests the West River/Chittenden Park area as a pilot study area.
    4. Resources 5.3: Carefully regulate development and redevelopment along the shoreline, expanding the use of buffers to facilitate storm surge and wave attenuation.
    5. Resources 5.4: Consider the implementation of increasing building standards to enhance coastal resilience, such as adopting freeboard, liberal building height standards, and applying V Zone standards in A Zones.
    6. Resources 5.5: Consider pursuing acquisition of properties in flood-prone areas susceptible to sea level rise as appropriate.

    (p. 63)

5. Hamden Plan of Conservation and Development (Adopted 2004, Amended 2009)

- The plan identifies the "Protection of flood prone areas in the Town through the use of floodplain protection measures and regulations of new development" as an objective under the plan's Environmental Considerations element. (p. 32)
- In the plan's Parks, Recreation and Open Space element, the Town indicates that "The protection of land directly adjacent to the Town's watercourses including surrounding wetlands and floodplains should be a continued focus of the Town open space plan. Continued implementation of the Town's wetland and floodplain regulations to ensure that the watercourses are properly buffered from development and storm water runoff is recommended." (p. 39)
- Flood Control is a category in the plan's Community Facilities and Infrastructure element. The scope of this section is limited but does mention participation in FEMA's National Flood Insurance Program (NFIP). (p. 47)

6. Madison 2013 Plan of Conservation & Development (2013)

- As part of the plan's Conservation and Sustainability element, the Town has identified an objective to *Encourage Sustainable Practices* and introduces the term resiliency as term "resiliency" the community's ability to readily recover from sudden changes or adversity. (p. 53)
- More specifically, the plan calls for the Town to "*Prepare For Possible Sea Changes*" including a "rise in sea levels" and "an alteration in storm frequency and severity." This includes continuing the

following three policies: "(1) Remain informed and aware of sea level projections and storm projections; (2) Participate in regional and state programs evaluating the issue of sea level rise and storm impacts; and (3) Seek to prevent or minimize losses in vulnerable areas." (p. 60)

- The plan also indicates that the Town should "Continue to Emergency Preparedness Planning" and more specifically that "Madison should continue to review and improve hazard mitigation plans (recurring events, such as flooding) and emergency preparedness plans (single events) in order to be able to respond to these events in the future." (p. 63)
- The plan encourages the adoption of "low impact development" provisions for drainage systems. (p. 56)

7. Milford - 2022: Plan of Conservation and Development, Milford, Connecticut (2012)

- In discussing future land use trends in the Land Use element, the plan notes how Milford's shoreline is changing and being redeveloped due to natural and destructive events and that the "rate of this redevelopment will increase as sea levels continue to rise, flood zones expand, and more extensive damage occurs from smaller weather events that previously did not damage property." (p. 19)
- In the Coastal Resources and Long Island Sound element, the plan identifies "Flood Hazards" as the most significant and common natural hazard for the city. It goes on to describe how its geography, topography, and development history have made it a flood prone community with some of the city's highest density neighborhoods being the most vulnerable to storm event flooding. (p. 44-47)
- The plan includes a dedicated section on "Sea Level Rise," noting that increased sea levels are expected to result in more flooding and increased height of storm surge for coastal cities such as Milford (p. 51), and that the City should "analyze the benefits and costs of a retreat policy" (p. 52). This increased risk is also addressed in the Action Plan, calling for the City to "Assess the City's Sea Level Rise impacts and risks and develop and Climate Adaptation Plan." (p. 148)
- The Action Plan makes a direct linkage to the hazard mitigation plan by stating "Per the City's Hazard Mitigation Plan, continue to institute hazard mitigation policies where possible, particularly where related to reducing flood hazards, including grant applications for elevation and acquisition." (p. 148)

8. New Haven Vision 2025: A Plan for a Sustainable, Healthy, and Vibrant City (2015)

- As noted in the plan's Executive Summary, "Adapting to emerging sea level rise and reducing the carbon footprint are key environmental priorities of the city."
- The Environment Element includes detailed descriptions of coastal and inland flooding hazards, sea level rise, and climate change. (p. VII-14–VII-16)
- The vision and recommendations within the plan are guided by five planning themes, including "Adapt." Specific recommendations under this theme for various plan elements include the following:
    1. Land Use: "Adapt to sea level rise and other coastal events by flood proofing structures in areas prone to repetitive floods (as discussed within the Environment chapter) and by reviewing, assessing, and revising the floodplain ordinances of the City periodically." (p. III-20)
    2. Transportation: "Adapt to sea level rise and other coastal/inland flooding events by ensuring that the design of complete streets considers the requirements for emergency vehicle access" and "Adapt to sea level rise and other coastal/inland flooding events by working with the Office of Emergency Management to identify, prioritize, and publish evacuation routes within the city on a scenario-based approach." (p. V-28)

3. Economic Development: "Adapt to sea level rise and other coastal/inland flooding events by identifying and seeking new sources of funding to address and improve the resiliency of properties in V and VE flood zones" and "Adapt to sea level rise and other coastal/inland flooding events by participating in FEMA's Community Rating System so that all property owners in coastal areas, including businesses, can avail a discounted rate on their flood insurance costs." (p. VI-26)
4. Environment: "Adapt to sea level rise and other coastal/inland flooding events by implementing flood proofing, coastal resiliency, and shoreline stabilization measures along the coast" and "Adapt to sea level rise and other coastal/inland flooding events by continuing to strictly enforce the City's floodplain ordinances to limit developments in SFHAs and by updating and adopting the City of New Haven Natural Hazard Mitigation Plan and Climate Action Plan, in addition to identifying and seeking funding opportunities to correct coastal, as well as inland, flooding issues within the city." (p. VII-30)

9. Plan of Conservation and Development Town of North Branford, Connecticut (2009)

- The plan describes existing floodplains and floodplain regulations, noting that development or alteration of areas within the 100-year floodplain area is restricted by local regulations that follow federal (FEMA) standards. (p. 14)
- The plan addresses storm drainage and flooding in the Infrastructure element, noting that there have been significant improvements to control flooding along the Branford River. It describes the remaining areas of flooding concern, primarily along the Farm River, and recommends that "any solution to the flooding problem should be non-structural in nature, and minimize adverse environmental impacts. The most effective approach would be from an analysis of the entire basin, on an inter-municipal basis." (p. 22)
- The plan incorporates a brief section on Climate Change, but with more of a focus on mitigation versus adaptation strategies (p. 16).

10. North Haven Plan of Conservation and Development (2017-2027)

- Under the Land Use and Zoning element, the plan identifies the goal to "Reduce stormwater impacts of new development through land use regulations." Strategies include revising land use regulations to encourage or require low-impact development techniques; reviewing and revising stormwater drainage provisions in zoning regulations to require "best practice" methods in site design; periodically reviewing existing development regulations and standards for opportunities to reduce or eliminate impervious surface requirements; and protecting flood-prone areas with floodplain protection measures and regulations of new development. (p. 20)
- Under the Transportation, Infrastructure, and Community Facilities element, the plan identifies the goal to "Continue to maintain, improve, and remedy deficiencies in North Haven's storm sewer system." Strategies include but aren't limited to repairing and replacing catch basins and culverts as needed; implementing a regular storm drain cleaning plan; and correcting areas identified in the Town's Master Drainage Study as storm drainage areas of concern. (p. 36)
- Under the Natural and Historic Resources and Open Space element, the plan identifies the goal to "Reduce stormwater impacts of new development through land use regulations." Strategies include many of the same strategies as identified under the Land Use and Zoning element listed above. (p. 49)

- The Natural and Historic Resources and Open Space element includes narrative and illustrative information on existing flood zones and a section on *Sea-Level Rise and Coastal Resilience.* The section notes that the Town's Coastal Site Plan Review process provides an opportunity for consideration of factors relating to potential future sea-level rise and identifies a series of policies that are strongly recommended for consideration. These policies were adopted as strategies under the goal to "*Anticipate Sea Level Rise*" as follows:
  1. Explore instating a prohibition on basements in all new commercial development projects in the 500-year floodplain and require utility installation above adjacent AE flood heights. This would allow for less expensive wet or dry-floodproofing in the future.
  2. Consider future flooding and sea level rise projections for any special planning initiatives for the TOD area surrounding the proposed NHHS North Haven station, including special development standards for flood protection and future sea level rise accommodation.
  3. Consider establishing a future sea level overlay zone to require alternate development standards within this overlay zone.
  4. Consider allocating funds to the acquisition of storm-damaged properties and conversion to open space to allow for tidal marshland advancement where possible.
  5. Review all roadway replacement projects within the Quinnipiac River corridor with potential elevation in mind as needed to keep up with projected sea level rise impacts.
  6. Review bridge replacements as identified in POCD to be designed to accommodate future sea level rise projections wherever they cross the Quinnipiac watershed such as Sackett Point Road. (p. 51)

11. Orange 2015 Plan of Conservation and Development (2015)

- The plan incorporates a new Sustainability and Resiliency element into the plan, defining resiliency as "the community's ability to readily recover from sudden changes or adversity," and placing a high value on the Town capabilities for emergency preparedness and response along with disaster risk reduction. (p. 57)
- Under the Sustainability and Resiliency element, the plan identifies the following policies and initial tasks to promote resiliency:
  1. Continue to review and improve hazard mitigation plans for recurring events, such as flooding.
  2. Continue to review and improve emergency preparedness plans.
  3. Assess the vulnerability of infrastructure (e.g., utilities, transportation, structures) to climate change and increased frequency of extreme storms and develop adaptation strategies. (p. 60)
- Under the Natural Resources element, strategies for *Water Quantity Management* are identified in addition to the following problem areas regarding flooding: Wrights Pond / Old Grassy Hill (undersized culvert); Coachmans Lane / Old Country Road (undersized culvert); Margaret Drive/Mallard Drive (lake flooding due to outlet structure); Surrey Drive (flooding from the Wepawaug River); and Prudden Lane (flooding from the Wepawaug River). The plan notes that if the frequency and severity of large storms increases in the future (as is expected), flooding is expected to become more severe as well. The importance of new approaches for stormwater management, including Low Impact Development and Best Management Practices, is also described in this element. (p. 28-30)
- Numerous policies are identified in the Natural Resources element relating to flood risk reduction, including but not limited to the following:

1. Manage water quantity by seeking to replicate the natural water cycle in terms of infiltration and runoff.
2. Implement "low impact development" practices to help manage water quality and water quantity issues.
3. Seek to reduce the amount of effective impervious coverage to help reduce pollutants and runoff.
4. Anticipate and address flooding issues in the community.
5. Consider managing water resource issues on a watershed basis.
(p. 31)

- The goal of improving storm drainage and related policies are included in the Utility Infrastructure element, including the transition to a low impact development approach to managing drainage for the town. (p. 122)

12. Wallingford Plan of Conservation and Development 2016-2026 (2016)

- Under the Conservation, Open Space, and Agriculture element, the plan identifies the goal to "Reduce stormwater runoff impacts of development." Strategies include revising zoning regulations to incorporate best management practices; considering incorporating low-impact development standards in zoning regulations throughout commercial and industrial districts; adopting strengthened Watershed Protection District regulations already prepared; and educating landowners, developers, and zoning administrators on application and implementation of best practices.

13. West Haven CT Plan of Conservation & Development (2017)

- Under the Beachfront and the Beach section of Chapter 4, the plan establishes a goal to "Coordinate POCD implementation with the Harbor Management Plan and Coastal Resilience Plan." (p. 76) It also more specifically identifies the strategy to "Follow Coastal Resilience Plan Recommendations and Guidance for Coastal Development," in which it describes those beachfront areas that are at risk to periodic flooding. (p. 78)
- As part of the strategy to revitalize Beach Street, the plan notes "the need for redevelopment and revitalization in the Beach Street corridor should also consider and mitigate the potential risks of damage from flooding." (p. 82)
- As part of the section on Parks, Recreation, and Open Space within the Community Facilities element, the plan notes that recent storm surges and flooding has elevated the importance of open space. It goes on to describe how (and where) the City is using available post-disaster grant funds to purchase floodplain easements to help make the town more resilient to future flood and storm surge events. (p. 110-112)
- Under the Natural and Coastal Resources element, the plan includes a specific subsection on Coastal Flooding. The narrative includes reference to FEMA floodplain maps as well as the Coastal Resilience Plan which "provides a framework for policy, regulatory, and infrastructure solutions to protect the coastal area from flooding." (p. 129) Goals under this element include but are not limited to the following:
    1. Promote the utilization of green stormwater infrastructure in public and private infrastructure and real estate development projects.
    2. Promote the conservation and protection of natural and coastal resources as part of future development and redevelopment. Future development and redevelopment at locations with

direct frontage on coastal waters should be dominated by water-dependent uses. Water-related uses should be relegated to locations separated by a road, other land and/or public beach.

3. Promote low-impact development, or environmentally sustainable construction, building, and landscape techniques, designs, and technologies in future development and redevelopment projects.
4. Support the goals of and coordinate the implementation of POCD strategies with the Coastal Resilience Plan and the Harbor Management Plan.
(p. 133)

- Under the section on Utilities within the Community Facilities element, the plan establishes a goal to "Manage flood risks for existing and planned community facilities within the coastal management area and within Special Flood Hazard Areas (SFHAs)." (p. 123)
- Under the Historic Resources element, as part of the strategy to Review, Update, and Digitize the Local Inventory of Historic Structures, the plan states that "the city should note whether any historically-significant properties are located within a Special Flood Hazard Area or otherwise susceptible to flooding and evaluate them for special protection." (p. 138)

14. Town of Woodbridge 2015 Plan of Conservation and Development (2015)

- As part of the Sustainability element, the plan incorporates a section on *Disaster Preparedness and Resilience* which describes how recent severe weather events has "brought the need for increased attention to planning for natural disasters, including creating both physical infrastructure and policies and programs that can continue to function well under challenging conditions." The section goes on to briefly describe the Town's current priorities and capabilities to respond to emergency situations and reduce future disaster risks, as well as needed improvements, including emergency shelter upgrades and minimizing electric outages during and after severe weather events. (p. 123)
- Under the Natural Resources element, the plan describes how local lakes and streams pose flood hazards that can be a serious risk to both property and safety. It notes that while Woodbridge's designated flood hazard areas cover less than 6% of its total area, these designations affect some 296 parcels within the Town. It states that "For landowners whose parcels lie within the 100-year flood zone, mitigation measures and flood insurance provided by FEMA through the National Flood Insurance Program can help reduce the risk of costly damage from a serious flood." (p. 82)
- Under the action plan for the Natural Resources element, the Town identifies the adoption of "low-impact development regulations and best management practices into development regulations" as a near-term agenda item. (p. 87)
- Low-impact development was also introduced and included as part of the action plan for the plan's Sustainability element, with the adoption of "low-impact development provisions into Town zoning and subdivision regulations" identified as a mid-term agenda item. (p. 131)

Coastal Resilience Plans

To help build and enhance the long-term resilience of coastal areas specifically, 5 jurisdictions in the region recently prepared and adopted their own Coastal Resilience Plans including Branford (June 2016), Guilford (May 2014), Madison (June 2016), Milford (June 2016), and West Haven (March 2017). Preparation of these plans were funded through the United States Department of Housing and Urban Development's (HUD's) Community Development Block Grant Disaster Recovery Program (CDBG-DR). These funds were allocated to HUD through the 2013 Disaster Relief Appropriations Act, which designated aid assistance for communities affected by Hurricane Sandy.

The planning process used to prepare the plans was loosely based on the coastal resilience planning process established in 2011-2012 by The Nature Conservancy (TNC) to address the current and future social, economic, and ecological resilience of the shoreline to the impacts of sea level rise and anticipated increases in the frequency and severity of storm surge, coastal flooding, and erosion. The process included four general steps, including:

1. Generate awareness of coastal risks.
2. Assess coastal vulnerabilities, risks, and opportunities.
3. Identify options or choices for addressing risks.
4. Develop and implement an action plan to pursue selected options.

Each of the Coastal Resilience Plans for the jurisdictions listed above present a menu of jurisdiction and location-specific options that are available to adapt to changing conditions or, at the very least, prepare for the future events like Hurricane Sandy. Each plan has been reviewed for consistency and integration with this plan as appropriate, including the addition of some higher priority projects or activities into the Mitigation Strategy in Chapter 6. These specific projects and activities are included in each applicable jurisdiction's mitigation action plan, and the entire list of recommended actions from the Coastal Resilience Plans are incorporated by reference in Appendix D: Mitigation Strategy Support Materials.

Regional Framework for Coastal Resilience for Southern Connecticut

In addition to the local Coastal Resilience Plans, SCRCOG, in association with Metropolitan Regional Council of Governments (MetroCOG) and the Nature Conservancy (TNC), developed a *Regional Framework for Coastal Resilience for Southern Connecticut* in 2017 (regional framework). The regional framework addresses strategies for reducing coastal flooding risks for seven communities in SCRCOG (Milford, West Haven, New Haven, East Haven, Branford, Guilford and Madison) and three communities in MetroCOG (Fairfield, Bridgeport, and Stratford). Over 300 regional mitigation projects were identified with a primary focus on green infrastructure and hybrid projects, including many that incorporate coastal resilience actions as identified in the local plans. In addition, various hard engineering projects were also proposed by individual towns, such as seawalls and berms. In some cases, state or federal grants and other funding sources are still needed to further analyze, design and implement these projects; though as done for the above-referenced local plans, some of these projects have also been included in each applicable jurisdiction's mitigation action plan. A complete listing of projects can be found in Appendix D: Mitigation Strategy Support Materials.

The Regional Framework, in combination with the jurisdiction-specific Coastal Resilience Plans and the network of other local plans, have helped participating coastal cities and towns integrate hazard risk reduction initiatives across existing community planning and development processes Figure 1. illustrates how these local plans are

linked together through various areas of focus that relate to managing hazard risk and resilience throughout the coastal zone.

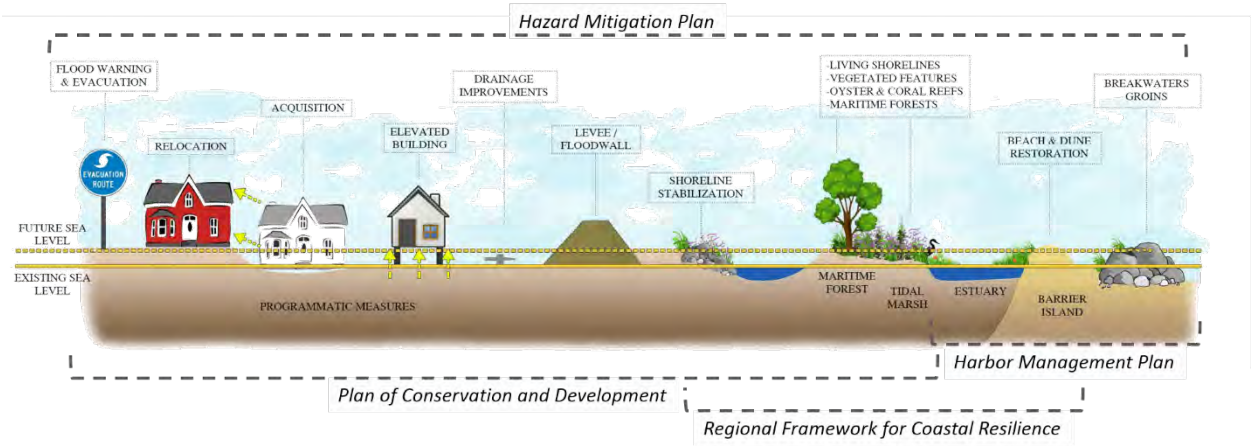


Figure 5-94 Example of Local Plan Integration, City of West Haven

Regional Emergency Support Plan

Due to the lack of county government structure in Connecticut, and to facilitate improved emergency management planning and regional collaboration, the State developed with its local partners, 5 emergency preparedness regions in 2007. The South Central Region is part of DEMHS[399] Region 2. This 30-jurisdiction area encompasses all of the South Central Region jurisdictions, the Valley Council of Governments (Shelton, Derby, Ansonia and Seymour), and jurisdictions in other Council of Governments including Cheshire, Middlefield, Durham, Haddam, Killingworth, Clinton, Chester, Deep River, Essex, Westbrook and Old Saybrook. Each DEMHS Region, working with their Regional Emergency Planning Team (REPT), made up of representatives from all public safety disciplines and planning organizations, releases its own Emergency Support Plan (RESP) and Public Safety documents. The REPT maintains and use an RESP to support mutual aid among regional communities in emergencies. The RESP does not usurp local Incident Command or operational aspects of existing plans. Like traditional mutual aid, the RESP is another support tool for the local CEO and IC and does not interfere with local management of an emergency. Region 2 last updated its Regional Emergency Support Plan in 2012.

State Historic Preservation Office (SHPO) Reports

Each of the coastal towns in the region received its own report under the SHPO grant (Milford, West Haven, New Haven, East Haven, Branford, Guilford, and Madison). These reports were considered when identifying mitigation actions. Actions may include conducting a survey to identify historic resources in areas of risk. The SHPO offers funding for some actions such as these. Each report includes eight categories of resilience strategies that are identified below:

[399] CT Department of Emergency Services and Public Protection (DESPP), Division of Emergency Management and Homeland Security (DEMHS).

- Strategy 1: Identify Historic Resources
- Strategy 2: Revisit Historic Preservation Regulations and Ordinances
- Strategy 3: Coordinate Regionally and with the State
- Strategy 4: Revisit Floodplain Regulations and Ordinances
- Strategy 5: Incorporate Historic Preservation into Planning Documents
- Strategy 6: Strengthen Recovery Planning
- Strategy 7: Adaptation Measures
- Strategy 8: Educate

DATA GATHERING METHODS

To update the data gathered from the original plan jurisdiction meetings were held. These meetings are discussed in greater detail in the Chapter 3. Planning Process. Each jurisdiction was given a copy of the original tables and asked to make updates and corrections. The data included the following five sections:

1. Planning and Regulatory Capabilities
2. Administrative and Technical Resources
3. Financial Resources
4. Education and Outreach Capabilities
5. Floodplain Management

PLANNING AND REGULATORY FINDINGS

Planning and regulatory capability is based on what plans or programs exist and how they are implemented. Their existence and use indicates a jurisdiction's commitment and ability to manage development and disasters in a safe and effective manner. Connecticut's 2014 Natural Hazard Mitigation Plan Update shows how local jurisdictions implement state and federal regulations in Table 5-206.

Table 5-206 Local Plans and Regulations Used by Communities[400]

Plan or Regulations	Significance to Hazard Mitigation	Effective for Hazard Mitigation?
Emergency Operations Plans	Assist local communities in the preparation and implementation of resources prior to and during an emergency, including natural hazard events. The plans are updated annually and help local communities assess the locations of vulnerable areas within their communities and how to handle these areas during an emergency. This plan may be a good source of information for local risk assessment activities.	Not directly used for hazard mitigation, but the process of updating the local EOP will help inform vulnerability and risk assessments, and will help identify gaps in capabilities at the local level.
Floodplain Management Regulations/ Ordinance or Flood Damage Prevention Regulations/Ordinance	These regulations assist a community in effectively manage its floodplain areas and are typically organized similar to the NFIP regulations. These regulations are usually part of a community's land use regulations (described below). However, depending on the	Typically very effective. Some communities may benefit from updating these regulations and more strongly linking the municipal code and zoning regulations (when they are found in both). Local hazard mitigation plans

[400] Connecticut's Natural Hazard Mitigation Plan Update, 2014, Table 3-7 Local Plans and Regulations Used by Communities, p.315-316.

Plan or Regulations	Significance to Hazard Mitigation	Effective for Hazard Mitigation?
	community, they may be a part of the municipal code of ordinances. These regulations may require specific minimum design/construction/or development elements which must be complied with for health and safety reasons.	typically recommend these types of modifications.
Zoning Regulations	Primary tool for community for shaping the character and development of a community. Zoning regulations may restrict particular uses or structures from being located in vulnerable areas in a community. These regulations may also require specific minimum design/construction/or development elements which must be complied with for health and safety reasons. If the flood damage prevention regulations are not in the municipal code of ordinances, they are typically in the Zoning Regulations.	Zoning Regulations are typically very effective for mitigating several hazards (flooding, geologic hazards, and wind hazards) because they guide development in flood zones, on slopes, and near sensitive resources; and because they regulate structures and accessories (such as signs) that can be damaged or cause damage during events.
Subdivision Regulations	Important tool for community for shaping the character and development of a community through subdivisions. These regulations often describe how flood prone areas must be addressed, specify minimum and maximum roadway dimensions, specify where utilities may be placed (underground vs. above-ground), and specify how fire protection will be provided. Some elements of the flood damage prevention regulations are often repeated in the Subdivision Regulations.	Subdivision Regulations are typically very effective for mitigating several hazards because they specify how roads and lots should be arranged and appropriately sized for safe access and egress. They may also specify how fire protection should be provided, which helps mitigate for wildfires and wildland fires.
Stormwater Regulations	Some communities have developed stormwater regulations or ordinances that are separate than the Zoning and Subdivision Regulations. Stormwater regulations provide requirements for addressing stormwater in connection with development, redevelopment, and road projects.	When available, these regulations are often very effective. Not all communities follow the same principles for managing stormwater. Therefore, local hazard mitigation plans typically include discussion about how to best to manage stormwater.
Wetland Regulations	In Connecticut, all wetland regulations describe wetlands as necessary for a number of functions including flood management. These regulations help a community maintain and protection the integrity of its wetland resources. Wetland areas often coincide with FEMA delineated floodplain areas in a community.	Wetland regulations are most effective for mitigation of flood hazards when setbacks and review areas are very wide. Many communities enforce wide review areas, such as 100 feet or greater, which aids mitigation. Examples of 200 feet are found in some communities.
Local Adoption of CT State Building Code	Critical to maintain adequate safety and building integrity factors in construction. In addition, these codes may limit structure size, type or place additional requirements in the construction of structures located in a identified hazard area (i.e., high wind, coastal, floodplain, wildland/urban interface area, etc.).	Very effective. All local communities must adopt the state codes.
Local Plan of Conservation and Development	Primary plan that helps guide a community in its land use and management decisions with regard to development and conservation and/or preservation of open space.	These plans are effective when communities use them to modify zoning districts and regulations, acquire open space, and actively guide development and infrastructure expansions. Because the plans are updated once per decade, many communities are now incorporating discussions about natural hazards and climate change for the first time in the updated plans.
Local Municipal Coastal Programs	Assists local coastal communities ensure compliant development and management of coastal resources and to prevent adverse impacts on coastal resources. As the municipal coastal programs are updated, communities typically increase the emphasis on coastal hazard mitigation and management.	Many of the 1982-1983 editions of these plans do not address elements of hazard mitigation, but they typically address coastal hazards as they are updated. In communities that have updated their municipal coastal programs since the year 2000, these documents are very effective in helping the community mitigate for coastal hazards.

Table 5-207 indicates with a check mark the positive responses each SCRCOG jurisdiction made to the question of existence of each of the plans listed in the first column. Many of the positive responses indicate compliance with state standards. Also, for some of the smaller jurisdiction their plans may overlap. For instance, economic development may in fact be covered in the comprehensive master plan.

Table 5-207 Planning and Regulatory Findings

	Bethany	Branford	East Haven	Guilford	Hamden	Madison	Milford	New Haven	North Branford	North Haven	Orange	Wallingford	West Haven	Woodbridge
Comprehensive Master Plan	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Capital Improvements Plan	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Economic Development Plan	✓	✓	✓	✓	✓	✓		✓			✓	✓		✓
Local Emergency Operations Plan	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Continuity of Operations Plan	✓		✓		✓					✓	✓	✓	✓	
Transportation Plan	✓	✓	✓	✓			✓	✓				✓	✓	
Stormwater Management Plan	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Community Wildfire Protection Plan					✓									
Disaster Recovery Plan			✓		✓		✓		✓		✓			✓
Coastal Zone Management Plan		✓	✓	✓			✓	✓		✓	✓		✓	
Climate Change Adaptation Plan				✓			✓	✓			✓			

	Bethany	Branford	East Haven	Guilford	Hamden	Madison	Milford	New Haven	North Branford	North Haven	Orange	Wallingford	West Haven	Woodbridge
Coastal Resilience Plan		✓	✓	✓		✓	✓	✓					✓	
Building Codes Adequately Enforced	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Zoning Ordinance Adequately Enforced	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Land Use Planning	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Zoning Ordinance	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Subdivision Ordinance	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓	✓	✓	✓
Natural Hazard Specific Ordinance	✓				✓			✓	✓		✓			✓
Acquisition of Land for Open Space & Recreation	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓	✓	✓	✓

During the jurisdiction meetings, the following points regarding planning and regulatory capabilities were noted as significant:

- Hamden reported that they would like to have a Snow Load Study done on their critical facilities.
- Milford reported in their jurisdiction meeting that they have received from the Connecticut Department of Energy and Environmental Protection (DEEP) a Dam Failure Study. They also have a Harbor Management Plan and a Capital Improvement Project Plan.
- New Haven reported that they use their Hazard Mitigation Plan for real-time purposes and refer to the critical facility list during a disaster for a list of shelters. They also reported that Yale University is currently developing a Resiliency Plan that should be completed in 2019. It will become part of the update to this plan in five years.
- Wallingford reported they have an All Hazard Group and have developed an internal Hazard Mitigation Plan. This plan was used for reference in updating Wallingford specifics in this hazard mitigation plan.
- West Haven views their Coastal Resilience Plan as a toolkit of options for mitigating risk. This list of mitigation options was reviewed and a list of actions was developed for this plan. They also reported that the University of New Haven actively works with them to solve problems related to stormwater.

ADMINISTRATIVE AND TECHNICAL FINDINGS

Administrative and technical resources are an indication of a jurisdiction's ability to implement hazard mitigation actions. This was measured by examining existing staff resources and interagency agreements. Administrative capability indicates how mitigation activities may be designated to specific departments, and technical capability indicates the level of knowledge or expertise held by jurisdiction employees. This section of the survey asks about administrative and technical resources in place to mitigate risks. The check marks in Table 5-208 indicate a positive response on the survey.

Table 5-208 Administrative and Technical Findings

	Bethany	Branford	East Haven	Guilford	Hamden	Madison	Milford	New Haven	North Branford	North Haven	Orange	Wallingford	West Haven	Woodbridge
Planning Commission	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Maintenance Programs to Reduce Risk	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Mutual Aid Agreements	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Chief Building Official	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Floodplain Manager	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Emergency Manager	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Community Planner		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
Civil Engineer	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
GIS Coordinator	✓	✓		✓	✓	✓	✓	✓	✓	✓			✓	✓
Warning Systems	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Hazard Data	✓	✓	✓				✓	✓	✓					
Hazus Analysis		✓	✓				✓	✓						

In the jurisdiction meetings, the following points were gathered regarding administrative and technical capacity:

- Bethany reported that 99% of residents rely on well water so they are without water during power outages. They also reported that the Human Services Department maintains a list, of oxygen dependent people and those with mobility needs, in case of emergency.
- East Haven reported they have a state-of-the-art 911 system and reverse 911 system.
- Guilford mentioned in their jurisdiction meeting their capacity to collect and store debris post disaster at "The Stump Dump" formerly called the Brush and Leaf Facility.
- Milford mentioned Long-Term Recovery issues are addressed by the Hazard Mitigation Plan Committee as an agenda item. The Committee meets monthly.
- Orange reported that they have Emergency Management Assistance Compact (EMAC) meetings monthly to discuss hazard mitigation.
- Wallingford has their own utility company which was reported to be less aggressive than United Illuminating at clearing trees but still does a good job and prioritizes their critical facilities when restoring power.
- Woodbridge mentioned that they are considering bringing their CERT team back. They also that they have a micro grid for town buildings and during power outages many people come to fill water buckets for themselves and their pets because their own wells do not work when the power is out.

FINANCIAL FINDINGS

The ability for a local government to implement mitigation actions is closely tied to the amount of money available to them. This availability is based on access to state and federal funding and the ability to levy taxes. Table 5-209 indicates with check marks positive responses to the ability to access the types of funding in the first column. Milford reported they have a Grants Committee that works to identify grants specifically for hazard mitigation and emergency management. Most municipalities mentioned wishing they had a grants specialist, someone to identify grant opportunities and put grant applications together.

Table 5-209 Financial Findings

	Bethany	Branford	East Haven	Guilford	Hamden	Madison	Milford	New Haven	North Branford	North Haven	Orange	Wallingford	West Haven	Woodbridge
Capital improvement project funding	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓
Authority to levy taxes for specific purposes		✓	✓	✓	✓	✓	✓	✓		✓			✓	✓
Fees for water, sewer, gas, or electric services		✓	✓				✓		✓	✓		✓	✓	✓
Impact fees for development		✓					✓							✓
Storm water utility fee														

Community Development Block Grant	✓	✓	✓	✓	✓		✓	✓	✓	✓		✓	✓	✓
Federal Funding	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
State Funding	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

EDUCATION AND OUTREACH FINDINGS

Frequently, education and outreach activities can be cost-effective mitigation actions that are often overlooked by local municipalities. Table 5-210 indicates which opportunities the jurisdictions have incorporated. The scarcity of check marks confirms that many municipalities have not utilized the full potential of education and outreach mitigation actions. North Branford reported that their Emergency Manager has held preparedness classes for their citizens. Several other municipalities mentioned similar efforts. Many municipalities are using the town website and social media to educate the public about emergency management.

Table 5-210 Education and Outreach Findings

	Bethany	Branford	East Haven	Guilford	Hamden	Madison	Milford	New Haven	North Branford	North Haven	Orange	Wallingford	West Haven	Woodbridge
CERT Team	✓		✓		✓		✓	✓			✓	✓	✓	
Public Education Program	✓	✓	✓			✓	✓	✓	✓					
Natural Disaster Program in Schools	✓		✓	✓			✓							
Citizen Group or Nonprofit Focused on Emergency Preparedness	✓				✓		✓	✓						
Public-Private Partnership for Disaster Issues		✓		✓		✓	✓	✓				✓		

NATIONAL FLOOD INSURANCE PROGRAM

C2. Does the Plan address each jurisdiction's participation in the NFIP and continued compliance with NFIP requirements, as appropriate? FEMA Requirement §201.6(c)(3)(ii)

Flooding represents the greatest and costliest natural hazard facing communities across the nation. At the same time, the tools available to reduce the impacts associated with flooding are among the most developed when compared to other hazard-specific mitigation techniques.

Capabilities for conducting community floodplain management and flood mitigation activities are typically guided, evaluated and enhanced through participation in the National Flood Insurance Program (NFIP). In addition to approaches that cut across hazards, such as education, outreach and the training of local officials, participation in the NFIP requires specific regulatory and administrative measures that enable government officials to determine where and how growth occurs relative to flood hazards. Participation in the NFIP is voluntary, but it is promoted by FEMA as a crucial means to implement and sustain an effective flood hazard mitigation program. Community participation in the NFIP also enables property owners within the community to purchase federally backed flood insurance for buildings and personal belongings.

All municipalities in the South Central Region actively participate in the NFIP and are in good standing with FEMA. Table 5-211 summarizes NFIP participation and policy statistics for each jurisdiction in the planning area as of November 30, 2017 with a comparison to statistics included in the previous plan. Statistics on past flood losses and claims payment is provided in the Hazard Analysis section (under *Flood*) and more site-specific information on at-risk structures and repetitive loss properties is provided in the Risk Analysis section. Statistics for the four jurisdiction's that joined this multi-jurisdiction plan are not shown for 2014. It's worth noting that of the previous 10 jurisdiction participants, half had an increase in coverage and half a decrease in coverage.

Table 5-211 NFIP Participation and Policy Statistics (FEMA November 30, 2017)

Jurisdiction	NFIP Entry Date	Current Effective Map	Number of Policies 2014	Number of Policies 9/30/2017	Amount of Premiums 2017	Amount of Coverage 2014	Amount of Coverage 2017	Amount of Change in Coverage from 2014-2017
Bethany	8/23/77	12/17/10	7	8	$5,769.00	$2,235,900.00	$2,368,800.00	$132,900.00
Branford	12/15/77	5/16/17	1,168	1,284	$1,846,967.00	$259,980,300.00	$309,984,900.00	$50,004,600.00
East haven	6/28/74	5/16/17	N/A	1,076	$1,469,541.00	N/A	$234,147,100.00	$234,147,100.00
Guilford	8/2/74	7/8/13	N/A	621	$920,634.00	N/A	$171,036,900.00	$171,036,900.00
Hamden	6/15/79	5/16/17	296	205	$351,956.00	$67,734,100.00	$65,038,900.00	$(2,695,200.00)
Madison	9/15/78	7/8/13	545	594	$1,098,024.00	$152,516,600.00	$175,443,900.00	$22,927,300.00
Milford	12/6/71	5/16/17	N/A	2,961	$3,131,502.00	N/A	$698,761,200.00	$698,761,200.00
New Haven	6/7/74	7/8/13	N/A	964	$1,436,325.00	N/A	$234,535,900.00	$234,535,900.00
North Branford	7/3/78	5/16/17	100	115	$115,861.00	$23,979,800.00	$27,208,900.00	$3,229,100.00
North Haven	9/17/80	5/16/17	133	138	$172,760.00	$38,762,200.00	$43,472,500.00	$4,710,300.00
Orange	3/18/80	12/17/10	75	69	$75,277.00	$19,861,200.00	$18,931,400.00	$(929,800.00)
Wallingford	9/15/78	5/16/17	234	149	$203,529.00	$53,022,500.00	$37,432,200.00	$(15,590,300.00)
West Haven	1/17/79	7/8/13	1,047	1,023	$121,117.00	$185,881,200.00	$215,930,000.00	$30,048,800.00
Woodbridge	3/16/81	12/16/17	74	55	$44,709.00	$20,160,300.00	$16,003,500.00	$(4,156,800.00)
Total			**3,679**	**9,262**	**$10,993,971.00**	**$824,134,100.00**	**$2,250,296,100.00**	**$1,426,162,000.00**

For a jurisdiction to participate in the NFIP, they must adopt a local flood damage prevention ordinance that requires jurisdictions to follow established minimum building standards in the floodplain. These standards require that all new buildings and substantial improvements to existing buildings will be protected from damage by the flood having a 1-percent- annual-chance of occurring (i.e., the 100-year flood), and that new floodplain development will not aggravate existing flood problems or increase damage to other properties.

All municipalities in the planning area have adopted and enforce local floodplain management regulations in compliance with NFIP standards. It is the intent of all communities covered by this plan to maintain continued compliance and local enforcement of all NFIP Regulations per 44 CFR Part 60.3 as required. Some municipalities have also gone beyond FEMA's minimum requirements. Table 5-212 provides a brief description of the higher regulatory standards and other floodplain management activities currently implemented in each jurisdiction, and how they will continue to comply with NFIP requirements.

Table 5-212 Floodplain Managers and Additional Notes

Jurisdiction	Floodplain Manager	CAV[401] or CAC[402] Visit	Additional Notes Indicated by Jurisdiction Representatives
Bethany	Inland-Wetlands Commission		Although not tasked as their primary mission, the Inland Wetlands Commission takes an active role in floodplain management. In addition, an abundance of the floodplain is under the umbrella of the Regional Water Authority and is subject to their management practices.
Branford	Town Engineer	March 2012	Ordinance Update April 2017
East Haven	Kevin White	2015	Change in the flood plain
Guilford	Town Engineer		
Hamden	Town Planner	2003	Heavy emphasis on drainage system maintenance prior to predicted major storm events

[401] CAV: Community Assistance Visit
[402] CAC: Community Assistance Contact

Jurisdiction	Floodplain Manager	CAV[401] or CAC[402] Visit	Additional Notes Indicated by Jurisdiction Representatives
Madison	Director of Public Works/ Town Engineer		Routine public education
Milford	Director of Permitting and Land Use	Scheduled Summer 2018	
New Haven	Building Department and City Plan Department	January 12, 2016	The City entered the Community Rating System in 2017. The CAV was conducted for this reason. Since the City entered CRS, floodplain management is carried out jointly by the City Plan and Building Departments.
North Branford	Town Engineer	September 2012	
North Haven	Town Engineer		Ordinance Update May 2017, FEMA and Connecticut DEEP held a public meeting to review flood maps in March 2017.
Orange	Director of Public Works/Town Engineer		
Wallingford	Environmental Planner		
West Haven	Assistant Planner		Floodplain management is carried out jointly by the Engineering and Building Departments.
Woodbridge	Department of Public Works, Operations Manager	2007	

Another key service provided by the NFIP is the mapping of identified flood hazard areas. Once prepared, the Flood Insurance Rate Maps (FIRMs) are used to assess flood hazard risk, regulate construction practices and set flood insurance rates. FIRMs are an important source of information to educate residents, government officials and the private sector about the likelihood of flooding in their jurisdiction.

Digital FIRMs (DFIRMs) for New Haven County first became effective on December 17, 2010. Updates were prepared to reflect re-analyzed coastal risks, resulting in the re-issuance of some DFIRMs on July 8, 2013. These

were re-adopted locally as necessary. Additional updates to some towns were prepared for the Quinnipiac River drainage basin, resulting in issuance of new DFIRMs for portions of the drainage basin on May 16, 2017. These changes were re-adopted locally as necessary. Therefore, the planning region currently consists of FEMA panels dated (effective) December 17, 2010; July 8, 2013; and May 16, 2017.

All the SCRCOG municipalities continue to participate in the NFIP and enforce local flood damage prevention regulations and ordinances. Given the changes to the FIRM in 2010, 2013, and 2017, all the SCRCOG municipalities have had opportunities to update their flood damage prevention regulations and ordinances in the last decade. The Connecticut Department of Energy and Environmental Protection continuously works with municipalities to review and support changes to regulations and ordinances that occur when maps are changed as well as between map updates.

While some of the SCRCOG municipalities have adopted freeboard requirements that exceed the minimum NFIP requirements, other municipalities have found that this is not necessary because the Connecticut State Building Code requires freeboard of one foot for A and V zones plus regulation of coastal A zones like V zones where a LimWa is established.

Table 5-213 NFIP Standards

Does the local floodplain ordinance exceed FEMA minimum requirements?	Bethany	Branford	East Haven	Guilford	Hamden	Madison	Milford	New Haven	North Branford	North Haven	Orange	Wallingford	West Haven	Woodbridge
Require freeboard (elevation requirements higher than the base flood)		✓	✓		✓		✓	✓	✓	✓			✓	
Require soil tests or engineered foundations		✓	✓				✓	✓	✓				✓	
Require compensatory storage for new developments		✓	✓	✓	✓		✓	✓	✓	✓			✓	
Prohibit or minimize new development in floodplain areas	✓		✓		✓			✓		✓			✓	
Prohibit or enforce higher standards for critical facilities subject to flood hazards	This is required by State Statute and State Building Code													

Does the local floodplain ordinance exceed FEMA minimum requirements?	Bethany	Branford	East Haven	Guilford	Hamden	Madison	Milford	New Haven	North Branford	North Haven	Orange	Wallingford	West Haven	Woodbridge
Provision for cumulative substantial damage/improvement requirements		✓	✓	*	✓		✓	✓	✓	✓			*	
Provisions that protect natural and beneficial functions of floodplains	✓		✓		✓		✓	✓					✓	

**Substantial damage lookback is 10 years; substantial improvement lookback is one year*

COMMUNITY RATING SYSTEM

The Community Rating System (CRS) is a voluntary program within the NFIP that encourages floodplain management activities that exceed the minimum NFIP requirements. Flood insurance premiums are discounted to reflect the reduced flood risk resulting from community actions meeting the following three goals of the CRS:

- Reduce flood losses
- Facilitate accurate insurance rating
- Promote awareness of flood insurance

For participating communities, flood insurance premium rates are discounted in increments of 5 percent. For example, a Class 1 community would receive a 45 percent premium discount, and a Class 9 community would receive a 5 percent discount. The CRS classes for local communities are based on 18 creditable activities in the following categories:

- Public information
- Mapping and regulations
- Flood damage reduction
- Flood preparedness

For the 14 municipalities participating in this plan, 4 have participated in the Community Rating System, East Haven, Hamden, Milford and New Haven. As Figure 5-95 below indicates, Milford and New Haven have a status of Current, while East Haven and Hamden have a Rescinded status. New Haven has made active participation in the CRS a priority as emphasized in their jurisdiction meeting. The City was admitted in 2017 and prepared recertification materials in 2018. Guilford is in the process for applying to the CRS. East Haven and Hamden may consider participation in the future.

	Connecticut						
090074	Cheshire, Town of	10/1/93	10/1/03	10	0	0	R
090076	East Haven, Town of	10/1/03	10/1/10	10	0	0	R
090096	East Lyme, Town of	10/1/91	05/1/16	8	10	5	C
090007	Fairfield, Town of	10/1/16	10/1/16	8	10	5	C
090078	Hamden, Town of	10/1/93	10/1/06	10	0	0	R
090082	Milford, City of	05/1/12	05/1/12	9	5	5	C
090084	New Haven, City of	05/1/17	05/1/17	7	15	5	C
090011	Newtown, Town of	10/1/91	10/1/91	9	5	5	C
090012	Norwalk, City of	10/1/93	10/1/98	10	0	0	R

1. For the purpose of determining CRS discounts, all AR and A99 Zones are treated as non-SFHAs.
2. Status: C = Current, R = Rescinded

CRS 7 APRIL 1, 2017

Figure 5-95 Community Rating System Participants' Status

SAFE GROWTH SURVEY

The Safe Growth Survey was updated as part of the planning process. It was distributed to each participating jurisdiction by way of the Advisory Committee. This unique survey instrument was drawn from a technique proposed by David Godschalk, FAICP and Professor Emeritus of City and Regional Planning at the University of North Carolina at Chapel Hill, to help better evaluate the extent to which each local jurisdiction is positioned to grow safely relative to its natural hazards. Appropriate planning, zoning and/or community development staff for each jurisdiction completed the statements, and the results are summarized in Appendix C.

In completing the survey each respondent was asked to indicate how strongly they agree or disagree with the "Safe Growth Statements" as they relate to their own jurisdiction's current plans, policies and programs for guiding future community growth and development, according to the following scale:

1 = Strongly Disagree 2 = Somewhat Disagree 3 = Neutral 4 = Somewhat Agree 5 = Strongly Agree

Averages were calculated for each question for the planning area as well as for each jurisdiction. Survey results are included in Appendix C: Capability Assessment Support Material.

In the summary Table 5-214 below, jurisdiction averages were calculated for each topic, with the 2012 average in black and the 2017 average in red. Regional averages were calculated for each subheading, and overall jurisdiction averages were calculated for the entire survey. The region had an average answer of 3.5 indicating mild agreement, which is up from the 2012 average of 2.9. Though most towns were near the average, Branford and North Haven are significantly lower at 2.9 and 3.0 respectively (indicating a neutral response). Bethany, New Haven and Woodbridge have higher average scores at 4.2, 3.8 and 3.8 implying a higher level of safe growth. Almost all the municipalities, except West Haven and North Branford, saw an increase in agreement to the safe growth statements. An asterisk indicates there was no information for that jurisdiction for that year.

While somewhat of a subjective exercise, the Safe Growth Analysis provides some quantitative measure of how adequately existing planning mechanisms and tools for each jurisdiction are being used to address the notion of safe growth as currently advocated by organizations such as FEMA and the American Planning Association (APA). In addition, the insertion of the survey instrument into the capability assessment was aimed at further integrating the subject of hazard risk management into the dialogue of local planners and to possibly consider and identify new mitigation actions as it relates to those local planning policies or programs already in place.

Table 5-214 Safe Growth Survey Analysis
(2012 average in black and the 2017 average in red)

Safe Growth Statement	Bethany	Branford	East Haven	Guilford	Hamden	Madison	Milford	New Haven	North Branford	North Haven	Orange	Wallingford	West Haven	Woodbridge	Region Average
Land Use															
Identifies hazard areas, develops and plans future development around hazard areas	3.6 **5**	2.3 **2.6**	* **4**	* **4.3**	2.6 **5**	2 **4**	* **4**	* **4.6**	5 **4.6**	3.6 **4**	2.3 **2.3**	2.6 **4**	5 **4.3**	* **4.3**	3.2 **3.7**
Transportation															
Limits access to hazards, guiding growth around hazards, and functions under disaster conditions	3.6 **4.3**	1.3 **3**	* **4**	* **3**	2 **3**	2 **3.3**	* **2**	* **4**	3 **4.3**	1 **2.3**	3.3 **5**	3.3 **3.3**	4.6 **2.6**	* **3.6**	2.6 **3.4**
Environmental Management															
Identified natural features protective against hazards, preservation and restoration promoted, development encouraged outside these	4.6 **5**	3.3 **4**	* **4**	* **4.6**	3.3 **4.3**	3.3 **3.3**	* **4**	* **3.3**	4.6 **3.6**	4.3 **3.3**	3.3 **4**	5 **4.3**	3.3 **3.6**	* **4**	3.8 **3.9**

Safe Growth Statement	Bethany	Branford	East Haven	Guilford	Hamden	Madison	Milford	New Haven	North Branford	North Haven	Orange	Wallingford	West Haven	Woodbridge	Region Average
Public Safety															
Constructed goals to monitor related to the Hazard Mitigation Plan. Define Public Safety Standards.	3.3 **3.3**	3 **3.6**	* **4**	* **3**	2.5 **3.3**	1.6 **3.3**	* **3.6**	* **4.3**	* **3.3**	2.3 **3.3**	3 **4**	2.5 **3**	4.5 **3**	* **4.3**	2.5 **3.5**
Zoning Ordinance															
Conforms to plan in terms of development, contains and controls overlay zones, recognizes hazard limits on zoning, prevents developing floodplains	4.7 **4.5**	1.2 **2.7**	* **4**	* **3.7**	3.5 **4.5**	3 **4.2**	* **4**	* **3**	3.6 **2.2**	3 **3.2**	2.7 **3**	4.2 **4**	5 **3**	* **4.5**	3.4 **3.6**
Subdivision Regulations															
Restrict subdivisions in/near hazard areas, provide for conservation subdivisions, allow density transfer in hazard areas	3.6 **4.3**	2.3 **1.6**	* **4**	* **4**	3 **3.3**	2.6 **3.6**	* **3.3**	* **3**	2.6 **3**	3.6 **2.3**	2 **2**	4 **3**	3.3 **2.3**	* **3**	3 **3.0**
Capital Improvement Program and Infrastructure Policies															

Safe Growth Statement	Bethany	Branford	East Haven	Guilford	Hamden	Madison	Milford	New Haven	North Branford	North Haven	Orange	Wallingford	West Haven	Woodbridge	Region Average
Limits expenses and facilities that develop hazard areas, funds hazard mitigation	2.6 **3.6**	1.3 **2.6**	* **3.6**	* **3**	2 **4**	1 **2.6**	* **4.3**	* **3.6**	3 **3.6**	3 **3.3**	2 *	3 **4.3**	5 **3**	* **3.3**	2.5 **3.4**
Other															
Small area or corridor plans recognize the need to avoid or mitigate natural hazards.	4.3 **3.6**	1 **3.3**	* **4**	* **4**	3.3 **3.3**	2.6 **3.3**	* **4**	* **5**	4.5 **3.6**	3 **3**	2.6 *	1 **3.3**	4.6 **4**	* **3.6**	2.9 **3.6**
Jurisdiction Average	3.8 **4.2**	1.9 **2.9**	* **3.9**	* **3.7**	2.7 **3.8**	2.2 **3.4**	* **3.6**	* **3.8**	3.7 **3.5**	2.9 **3**	2.6 **3.4**	3.2 **3.6**	3.7 **3.2**	* **3.8**	2.9 **3.6**
Overall Region Average	2.9	**3.6**													

CONCLUSION

The SCRCOG region has proven capable of mitigating risk. Each jurisdiction has the required plans and regulations in place and the resources to maintain these. Capabilities were discussed at all Advisory Group meetings and at each jurisdiction meeting.

All the jurisdictions indicate sufficient administrative and technical resources. However, in the smaller communities, the same employee fills multiple positions. For instance, the Floodplain Manager may also be the Town Engineer or Director of Public Works. All the municipalities participate in the NFIP and Milford and New Haven participate in the CRS. East Haven and Hamden are considering CRS participation, and Guilford has applied.

Each of the municipalities is well positioned to mitigate risks from natural hazards, and more importantly, the region has proven the capacity to collaborate on efforts to mitigate risk. The development of this plan and other planning efforts such as the Regional Framework for Coastal Resilience in Southern CT are examples of ways the region is successfully collaborating to mitigate risk.

CHAPTER 6. MITIGATION STRATEGY

A mitigation strategy that provides the jurisdiction's blueprint for reducing the potential losses identified in the risk assessment, based on existing authorities, policies, programs, and resources and its ability to expand on and improve these existing tools. **FEMA Requirement §201.6(c)(3)**

The hazard mitigation strategy is the culmination of work presented in the regional profile, risk assessment and capability assessment. It is also the result of multiple meetings and public outreach. The work of the Advisory Committee during the initial development of the 2014 plan in addition to the 2017-2018 plan update process was essential in creating, updating, or reaffirming the mitigation goals and individual jurisdiction actions included in this chapter. As described in Chapter 3 (Planning Process), the Advisory Committee worked in a consistent, coordinated manner to identify and prioritize the goals and mitigation actions for the region as a whole in addition to their own individual jurisdictions.

GOALS AND OBJECTIVES

C3. Does the Plan include goals to reduce/avoid long-term vulnerabilities to the identified hazards? FEMA Requirement §201.6(c)(3)(i)

MISSION STATEMENT

2018 Multi-Jurisdiction Hazard Mitigation Plan Mission:

Reduce or eliminate risk to people and property from natural hazards.

MITIGATION GOALS

The Advisory Committee worked to identify five goal statements for the initial 2014 plan (**Table 6-215**), each of which was revisited and reaffirmed (with only slight modification) during the second Advisory Committee meeting on September 14, 2017. As goal statements for the plan these are all intended to serve as "broad policy statements that explain what is to be achieved."[403]

During the initial plan's development, flooding and downed trees were identified as among the biggest shared concern across the region. As a result minimizing flood risk and limiting the impact of fallen trees became two of the goal statements. The collaboration and conversations that followed during subsequent Advisory Committee meetings helped to identify the other three goals of local community planning, regional collaboration and public awareness and preparedness. During the 2018 update process the Advisory Committee did revise the goal for trees, adding the first sentence "Support proper care of healthy, native trees across the region to increase its

[403] Local Mitigation Plan Review Guide, October 1, 2011, p.24.

resilience to natural hazards including severe storms, flooding, erosion, and extreme heat." This final, revised goal statement was agreed to during the Committee's meeting on February 8, 2018.

In addition, these goal statements were determined to be consistent with the goals of Connecticut's 2014 Natural Hazard Mitigation Plan Update.[404] These goals are as follows:

- Promote implementation of sound floodplain management and other natural hazard mitigation principles on a state and local level.
- Implementation of effective natural hazard mitigation projects on a state and local level.
- Increase research and planning activities for the mitigation of natural hazards on a state and local level.

Table 6-215 SCRCOG Mitigation Plan Goals

Goal Categories	SCRCOG Mitigation Plan Goals
Community Planning	1. Reduce the impact of natural hazards by integrating natural hazard mitigation policies and practices into local community planning.
Flood Hazards	2. Minimize flood hazards in the region by maintaining continued compliance with the National Flood Insurance Program, adopting higher regulatory standards for new floodplain development, and implementing flood mitigation projects for existing flood prone structures.
Trees	3. Support proper care of healthy, native trees across the region to increase their resilience to natural hazards including severe storms, flooding, erosion, and extreme heat. Limit the impact of fallen and other hazardous trees by collaborating with utility companies and property owners to cut limbs and remove trees that pose threats to buildings, infrastructure and utility lifelines.
Regional Collaboration	4. Build capacity for natural hazard mitigation and climate adaptation at the local level through regional collaboration.
Public Awareness and Preparedness	5. Increase public awareness and preparedness for natural hazards by implementing community-based public education programs across the region.

As can be seen in **Table 6-216**, the mitigation goals established for this plan help to ensure that all natural hazards identified in the risk assessment are addressed in some manner. In fact most goals address more than one type of hazard, including those classified as low risk. While many of the specific mitigation actions included later in this chapter are focused on mitigating the adverse impact of certain hazards classified as high or moderate risk per the

[404] Connecticut Natural Hazards Mitigation Plan Update, January 2014, p.7.

risk assessment, there are also many actions that seek to mitigate the impact of multiple hazards – and in some cases, all hazards (for example, many of the actions in support of increasing publice awareness and preparedness).

Table 6-216 Mitigation Goals and Hazard Risk

Mitigation Goals	High Risk Hazards	Moderate Risk Hazards	Low Risk Hazards
	Severe Winter Storm/Nor'easter Hurricane/Tropical Storm Coastal Flood Riverine Flood	Tornado Coastal Erosion Sea Level Rise Extreme Temperatures Severe Thunderstorm Urban Flood	Wildfire Dam Failure Drought Earthquake
Community Planning	✓	✓	✓
Flood Hazards	✓	✓	
Trees	✓	✓	✓
Regional Collaboration	✓	✓	✓
Public Awareness and Preparedness	✓	✓	✓

SCRCOG MITIGATION PLAN OBJECTIVES

SCRCOG intends to continue staying actively involved in hazard mitigation. They are fully committed to the mission of reducing risk to people and property in the region. Although this mitigation plan is for 14 jurisdictions, it is their intent to include all 15 jurisdictions in the region with their stated objectives. SCRCOG staff developed the following four objectives, as detailed in **Table 6-217**, based on the above mitigation planning objectives and the identified needs of the region.

Table 6-217 SCRCOG Mitigation Plan Objectives

Objective Category	Mitigation Plan Objectives
Mitigation Planning	1. Stay actively involved in mitigation planning for the SCRCOG region.
Multi-Jurisdiction Collaboration	2. Facilitate multi-jurisdiction collaboration between the SCRCOG jurisdictions.
Education	3. Provide education regarding natural hazards, grant opportunities, and mitigation and preparedness techniques.
Floodplain Management	4. Assist the SCRCOG jurisdictions with floodplain management and lessening the impact of flooding to the region.

PROGRESS OF LOCAL MITIGATION EFFORTS

The purpose of this section is to document and demonstrate the current status and progress made in achieving the goals outlined in the previous plan's mitigation strategy, and more specifically in completing prior mitigation actions as adopted by each participating jurisdiction. This section includes a tabular report for each jurisdiction, listed in alphabetical order, that includes a brief summary of the current status of each action and whether it has been carried over into the updated plan. For the four (4) jurisdictions that joined this regional plan update in 2017 (East Haven, Guilford, Milford, and New Haven), this report includes the status of mitigation actions as identified in their most recently adopted plan.

For any actions that have been carried over into the updated plan, the new action number is provided for reference under the last column in the table ("Keep for Plan Update?"). For those actions that were not carried over, a narrative explanation for why not is provided in the column titled "Status Description / Explanation." All new/updated mitigation actions for 2018-2023, including those that have been carried over from a previous plan, can be found for each jurisdiction under the subsection titled "Comprehensive Range of Mitigation Actions."

SCRCOG

South Central Region Council of Governments – Status of Prior Mitigation Actions					
Action #	**Action Title**	**Action Description**	**Current Status**	**Status Description / Explanation**	**Keep for Plan Update?**
1	Plan Maintenance	SCRCOG will maintain the current mitigation plan by seeking additional grant funding as needed.	Completed + To Be Continued	SCRCOG applied for and received FEMA grant funding to support a comprehensive update to the existing plan in 2017.	YES (see Action #1)
2	Increase Plan Participation for Local Jurisdictions	SCRCOG will work to incorporate the five jurisdictions not part of this plan as their plans expire.	Partially Completed / In Progress	SCRCOG successfully incorporated four additional jurisdictions to the 2017 plan update, including Guilford, Milford, East Haven, and New Haven. It is anticipated that the final jurisdiction, Meriden, will join the plan during the next update.	YES (see Action #4)
3	Promote the CRS Program	SCRCOG will educate their members about CRS and assist them with participation in the program if they are interested.	Delayed	SCRCOG has explored grant opportunities to conduct a Regional CRS Study for its member municipalities. In 2014 SCRCOG applied for a Regional Performance Incentive Program (RPIP) grant for a Regional CRS Feasibility Study but did not receive the award. SCRCOG has posted CRS reference links on its Hazard Mitigation web page.	YES (see Action #5)
4	Host and Facilitate Annual Mitigation Meetings	SCRCOG will facilitate multi-jurisdiction collaboration by hosting mitigation meetings on at least a yearly basis.	Completed + To Be Continued	SCRCOG hosted two multi-jurisdiction hazard mitigation meetings since the adoption of the 2014 SCRCOG Multi-Jurisdiction Hazard Mitigation Plan. The meetings were held in December of 2015 and April of 2016.	YES (see Action #2)
5	Mitigation Education and Awareness	SCRCOG will work toward educating their members with the creation and distribution of tools such as the Toolkit for Floodplain Mapping and PowerPoint presentation.	Partially Completed / In Progress	During the development of current multi-jurisdiction hazard mitigation plan, presentation material was provided to the municipalities through the development of a toolkit.	YES (see Action #6)
6	Maintain Mitigation Website	SCRCOG will maintain their Regional Hazard Mitigation webpages.	Completed + To Be Continued	SCRCOG created a Hazard Mitigation webpage during the development of the original multi-jurisdiction hazard mitigation plan. The webpage was updated as relevant information became available.	YES (see Action #3)

South Central Region Council of Governments – Status of Prior Mitigation Actions					
Action #	**Action Title**	**Action Description**	**Current Status**	**Status Description / Explanation**	**Keep for Plan Update?**
7	Promote Awareness of Mitigation Grant Funding Opportunities	SCRCOG will make their members aware of grant opportunities.	Completed + To Be Continued	SCRCOG provides grant information to its members on a monthly basis during the SCRCOG Board Meetings.	YES (see Action #7)
8	Mitigation Newsletter	SCRCOG will consider starting a newsletter as a method of educating their members about mitigation opportunities and strategies.	Cancelled	Due to a lack of funding, SCRCOG has not developed a hazard mitigation newsletter. SCRCOG has determined that the maintenance of the Hazard Mitigation webpage is the appropriate method of providing its members with information about mitigation.	NO (see explanation at left)
9	Explore Nature-based Mitigation Opportunities with Partner Organizations	SCRCOG will collaborate with groups such as the Nature Conservancy to explore opportunities for green infrastructure and natural system restoration opportunities.	Completed	SCRCOG has completed a Regional Framework for Coastal Resilience in Southern CT, which explores opportunities for green infrastructure. The Regional Framework was made possible through the Hurricane Sandy Competitive Grant program and was completed in partnership with the Nature Conservancy and MetroCOG.	NO (see explanation at left)

BETHANY

Town of Bethany – Status of Prior Mitigation Actions					
Action #	**Action Title**	**Action Description**	**Current Status**	**Status Description / Explanation**	**Keep for Plan Update?**
1	Hazard Tree Management	In coordination with private utility operators, develop and adopt an ordinance to require the routine inspection, maintenance and removal (if necessary) of hazardous trees along public rights of way which pose potential threats to power distribution lines.	Partially Completed / In Progress	This project is underway but due to the extreme number of affected trees it is anticipated that this project will take several years more to accomplish than originally predicted. Due to need, this project has developed into much more than development of an ordinance. Insect infestation has resulted in the need to begin an aggressive tree removal program. The Tree Warden has worked with representatives of the various utility companies to identify the trees needed for the most urgent removal located within the jurisdictional sphere of influence. Town funding of $50,000 in the FY 2015/2016 capital budget was set aside for this purpose. The removal program was started in July of 2015 and is ongoing.	YES (see Action #1)
2	Miller Road Culvert Expansion	Increase capacity of Miller Road Culvert to eliminate future and repetitive damages and loss of service to roadway and provide increased conveyance of stormwater during peak flows.	Delayed	To date other more urgent projects have taken precedence over this effort. The Miller Road Culvert is in the monitoring phase with the mitigation project not currently in the Town of Bethany Capital Improvement Plan. However, the Town is aiming to pursue debt financing through future bonding.	YES (see Action #6)
3	Town Hall Generator	Install electric generator and quick-connect transfer switch to provide backup emergency power for Town Hall.	Delayed	Initially due to funding constraints this project was not included in the FY 2015/2016 budget. The decision has now been made to allocate Capital Improvement Funding to the project and work is expected to commence in the summer of 2016.	YES (see Action #2)

Town of Bethany – Status of Prior Mitigation Actions					
Action #	**Action Title**	**Action Description**	**Current Status**	**Status Description / Explanation**	**Keep for Plan Update?**
				Funding has now been allocated using LOCIP funding. A needs assessment has been performed by a licensed electrician and physical installation is expected by the end of May 2018.	
4	Homebound and Elderly Resident Directory	Develop and maintain a Homebound and Elderly Resident Directory in order to quickly identify people with special needs during and following long-term power outages or other related emergency or disaster events.	Completed + To Be Continued	Confidential records are kept regarding the needs of individual residents. The senior bus personnel monitors and reports on current client conditions. EMS keeps track of special needs non-elderly residents. This is also a confidential list due to HIPPA consideration. Both agencies have a seat at the EOC in times of need and can share the information they possess as needed. No funding has been needed to date for this project. The Town will continue to collect data for both the senior and special needs population and will develop a method for Emergency Management to access data in time of emergency retaining confidentiality.	YES (see Action #3)
5	Community Shelter	Include in the plans currently underway to replace the existing hanger at the old airport on Amity Road, capabilities for the new structure to be used as a local community emergency shelter. This should include backup generator power and necessary facilities for overnight stays (kitchen and shower facilities).	Partially Completed / In Progress	The project is moving forward but has had delays due to the lengthy grant process. During removal of the original structure petrochemical contamination was discovered resulting in a mitigation process that delayed the start of construction. Town funding in two phases of $30,000 each (total of $60,000) was needed for the project. Phase one involved the removal of the original structure, site preparation and hazard mitigation has been accomplished. Phase two involved the construction of the new structure is underway with the shell	YES (see Action #4)

Town of Bethany – Status of Prior Mitigation Actions					
Action #	**Action Title**	**Action Description**	**Current Status**	**Status Description / Explanation**	**Keep for Plan Update?**
				complete, door installed, and floor work presently being done. To date $1,200,000 has either been expended or allocated for this project. Working in phases has prolonged segments of the project. Delays in the committee style planning process and necessary approvals/sign offs. The hazard mitigation process took far longer than anticipated at twice the original estimate. The Town will continue phase two work as far as funding permits. Fundraising efforts will be needed for completion as no additional grant money is expected in the immediate future.	
6	Water Supply	Coordinate with the CT Water Planning Council on drought preparedness and response planning activities to ensure the Town's unique vulnerabilities to water shortages (dependency on wells for potable water, coupled with large equine population) are adequately addressed through State and local action.	Delayed	Ninety-eight percent of Bethany's water needs are met by private water wells, it was difficult to identify needs associated with this initiative. Planners settled on the need for potable water during times of power outages. No funds have been expended to date for this project. A plan has been put in place to provide potable water in times of power outages. This includes potable water hoses at the Community School and Fire Headquarters the water pumps run by emergency power. A water tanker is arranged to be parked at Fire Headquarters to provide water for large animals located at farms without emergency power.	YES (see Action #7)

Town of Bethany – Status of Prior Mitigation Actions					
Action #	**Action Title**	**Action Description**	**Current Status**	**Status Description / Explanation**	**Keep for Plan Update?**
				The Town will interface with the regional water authority, (RWA) to identify potable water sources not affected by power needs.	

BRANFORD

Town of Branford – Status of Prior Mitigation Actions					
Action #	**Action Title**	**Action Description**	**Current Status**	**Status Description / Explanation**	**Keep for Plan Update?**
1	Linden Avenue Erosion Protection Project	Identify and construct erosion protection measures along the coastal exposure of Linden Avenue.	Partially Completed / In Progress	Town received an HMA grant to support this project for Linden Avenue, which is currently under design.	YES (see Action #1)
2	Generators for Town Buildings	Install stand-by generators at two shelters and upgrade generators at the EOC/Police Station and Volunteer Services Center and Wastewater Treatment Plant.	Delayed	Funding in place for WWTP generator only. Funding is not available for the other facilities as proposed.	NO (see explanation at left)
3	Meadow Street and Indian Neck Ave Flood Protection Project	Flood protection of Meadow Street and Indian Neck Avenue. Will protect CL&P substation and possibly improve access during times of flood.	Partially Completed / In Progress	Electric substation is being eliminated by power company (in progress). The Town would like to install flood gate at RR underpass to protect area to the north from coastal flooding.	YES (see Action #2)
4	Hotchkiss Structural Mitigation Project	Raising electronics at Hotchkiss Sewage Pumping Station, 23 Seaview Avenue.	Completed	Project is complete.	NO (see explanation at left)
5	Hazards Planning and Public Health Preparedness Project	To promote awareness/education on what businesses and property owners can do to prepare and prevent property damage and reduce injury and loss of life.	Completed	Project is complete.	NO (see explanation at left)

EAST HAVEN

Town of East Haven – Status of Prior Mitigation Actions					
Action #	**Action Title**	**Action Description**	**Current Status**	**Status Description / Explanation**	**Keep for Plan Update?**
1	ALL HAZARDS - General Recommendations	Disseminate informational pamphlets regarding natural hazards to public locations such as the Senior Center, Town Hall, library, and the like.	Completed + To Be Continued	Existing capability and ongoing activity (materials have been distributed for several years now. The Town has posted the recommended materials in the Town Hall, Library and Engineering Offices).	NO (see explanation at left)
2	ALL HAZARDS - General Recommendations	Add pages to Town website dedicated to citizen education and preparation for natural hazard events.	Partially Completed / In Progress	The Town is developing pages as advised. The Town website is under constant development and we are designing link pages from the Engineering office.	YES (see Action #2)
3	ALL HAZARDS - General Recommendations	Develop a checklist for land development applicants that cross references the specific regulations and codes related to disaster resilience.	Partially Completed / In Progress	Currently all applications are routed to the Town Engineer for review on compliance with applicable standards. Some applications require the signature of the Town Engineer for flood, erosion, and coastal area management compliance.	YES (see Action #30)
4	ALL HAZARDS - General Recommendations	Continue reviewing subdivision applications to ensure proper access for emergency vehicles.	Completed + To Be Continued	Existing capability and ongoing activity (subdivision applications are routed to the Fire Marshal's office for review prior to approval).	NO (see explanation at left)
5	ALL HAZARDS - General Recommendations	Require that utilities be placed underground in new developments.	Completed + To Be Continued	Existing capability and ongoing activity (zoning regulations require utilities be underground wherever possible).	NO (see explanation at left)
6	ALL HAZARDS - General Recommendations	Pursue funding to place utilities underground in existing developments.	Delayed	The Town is not currently eligible for these monies. Town will be eligible after regional plan put in place.	YES (see Action #22)
7	ALL HAZARDS - General Recommendations	Utilize the State's AlertNow service to its fullest capabilities.		Existing capability and ongoing activity (the Town now uses Everbridge and RedAlert).	NO (see explanation at left)
8	ALL HAZARDS - General Recommendations	Encourage residents to purchase and use NOAA weather radio with an alarm feature.	Completed + To Be Continued	Existing capability and ongoing activity (the Town advises residents on many preparation options and recommends they have NOAA radios).	NO (see explanation at left)

Town of East Haven – Status of Prior Mitigation Actions					
Action #	**Action Title**	**Action Description**	**Current Status**	**Status Description / Explanation**	**Keep for Plan Update?**
9	ALL HAZARDS - General Recommendations	Continue to review and update Emergency Operations Plan, at least once annually.	Completed + To Be Continued	Existing capability and ongoing activity (this is done annually).	NO (see explanation at left)
10	ALL HAZARDS - General Recommendations	Obtain copies of the disaster planning guides and manuals from the "Are You Ready?" series and make them available.	Completed + To Be Continued	Existing capability and ongoing activity (the Town prints these materials from the web as needed).	NO (see explanation at left)
11	ALL HAZARDS - General Recommendations	Improve lighting in shelters by wiring battery conditioners to generator circuits.	Delayed	DPW will address this issue in the next year (will implement a retro-fitting program at some point in 2018).	YES (see Action #23)
12	ALL HAZARDS - Specific Recommendations for Critical Facilities	Review and update the evacuation route map at least once annually and post it to the Town's website.	Completed + To Be Continued	Existing capability and ongoing activity (reviewed annually).	NO (see explanation at left)
13	ALL HAZARDS - Specific Recommendations for Critical Facilities	Pursue floodproofing for the Public Works Facility.	Partially Completed / In Progress	We are always looking at possible mitigation strategies for the yard. The Public Service Department is currently working a bid for gas pumps and will formulate mitigation plans post install.	YES (see Action #41)
14	ALL HAZARDS - Specific Recommendations for Critical Facilities	Pursue floodproofing for Police Department Headquarters.	Partially Completed / In Progress	The New 911 center is already fitted with operational contingencies, Engineering is studying the building for possible mitigation work.	YES (see Action #42)
15	ALL HAZARDS - Specific Recommendations for Critical Facilities	Consider floodproofing measures for Laurel Woods Convalescent Home at 451 North High Street and/or elevate the structure.	Delayed	The Town and the Commercial Property owner have not met concerning this.	YES (see Action #35)
16	ALL HAZARDS - Specific Recommendations for Critical Facilities	Develop a site-specific evacuation plan for Laurel Woods.	Delayed	The Town and the Commercial Property owner have not met concerning this.	YES (see Action #13)

Town of East Haven – Status of Prior Mitigation Actions					
Action #	**Action Title**	**Action Description**	**Current Status**	**Status Description / Explanation**	**Keep for Plan Update?**
17	ALL HAZARDS - Specific Recommendations for Critical Facilities	Work with residents to develop a satellite shelter for residents that may become isolated during coastal flooding.	Delayed	Due to flood zones the town lost a secondary shelter because it was in the flood zone. Looking for an alternate location.	YES (see Action #24)
18	ALL HAZARDS - Specific Recommendations for Critical Facilities	Develop an emergency evacuation plan for Morris Cove residents.	Cancelled	This action was included in error (Morris Cove is in New Haven).	NO (see explanation at left)
19	ALL HAZARDS - Specific Recommendations for Critical Facilities	Work with residents and the City of New Haven to develop an evacuation protocol for East Haven residents near Townsend Avenue.	Partially Completed / In Progress	Will caucus with New Haven OEM to complete this.	YES (see Action #25)
20	FLOODING RECOMMENDATIONS - Prevention	Continue to regulate activities within SFHAs to the greatest extent possible within the Zoning and Subdivision Regulations.	Completed + To Be Continued	Existing capability and ongoing activity (all applications are reviewed in conjunction with the Town Engineer to ensure compliance with State and local regulations. We stringently enforce all applicable Regulations to ensure compliance to FEMA standards.)	NO (see explanation at left)
21	FLOODING RECOMMENDATIONS - Prevention	Consider requiring new buildings in flood prone areas to be protected to the highest recorded flood level regardless of SFHA. status.	Cancelled	Town now requires freeboard to be one (1) foot above BFE.	NO (see explanation at left)
22	FLOODING RECOMMENDATIONS - Prevention	Provide FEMA with data obtained from other sources that would demonstrate need to revise the DFIRM; petition FEMA to review and revise.	Cancelled	The Town doesn't generate data to the extent that would justify challenging FEMA records. The Town only challenges the FIRMs on a case by case basis.	NO (see explanation at left)
23	FLOODING RECOMMENDATIONS - Prevention	Require developers to demonstrate whether detention or retention of storm water is the best option for reducing peak flows downstream.	Completed + To Be Continued	Existing capability and ongoing activity (zoning regulations require BMP and LID implementation wherever possible as part of a project's stormwater management plan).	NO (see explanation at left)

Town of East Haven – Status of Prior Mitigation Actions					
Action #	**Action Title**	**Action Description**	**Current Status**	**Status Description / Explanation**	**Keep for Plan Update?**
24	FLOODING RECOMMENDATIONS - Prevention	Review Subdivision Regulations and evaluate the possibility of incorporating changes to limit impermeable surfaces in flood prone areas.	Partially Completed / In Progress	Subdivision regulations currently do not include standards for impermeable surfaces. The Town's zoning regulations do provide lot coverage maximums, and applications are reviewed by Town Engineer's office for compliance with NFIP. Further research required.	YES (see Action #36)
25	FLOODING RECOMMENDATIONS - Prevention	Explore the possibility of adopting a series of ordinances that would place the responsibility for stream maintenance on a property owner.	Delayed	Zoning regulations would need to be adopted. However, most of the developable area around streams is already developed. Any new Zoning Regulations would take effect on new developments.	YES (see Action #37)
26	FLOODING RECOMMENDATIONS - Prevention	Conduct annual inspection of flood prone areas that are accessible to town officials. Determine if flood damage could be stormwater related.	Completed + To Be Continued	Existing capability and ongoing activity (site Inspections are ongoing).	NO (see explanation at left)
27	FLOODING RECOMMENDATIONS - Prevention	Develop a maintenance road along the Farm River to facilitate environmentally appropriate channel maintenance and clearing when necessary.	Cancelled	No longer considered applicable, as there is no funding or plans in place at this time for such work.	NO (see explanation at left)
28	FLOODING RECOMMENDATIONS - Prevention	Develop an application of an ISTEA Grant for stormwater pollution mitigation; includes identification, retrofitting, and cleaning of catch basins.	Delayed	The Town is not eligible for the grant funds at this time, but we have a permanent (yearly) and aggressive CB cleaning and replacement program that is currently active.	YES (see Action #3)
29	FLOODING RECOMMENDATIONS - Property Protection	Incorporate information on the availability of flood insurance into all hazard-related public education workshops.	Partially Completed / In Progress	The Town is designing a small syllabus for workshops this coming year.	YES (see Action #31)
30	FLOODING RECOMMENDATIONS - Property Protection	Make available FEMA provided flood insurance brochures at public accessible places such as the Town Clerk and the Planning & Zoning Dept.	Completed + To Be Continued	Existing capability and ongoing activity (the Town maintains FEMA brochures and NFIP materials at various locations and makes them available at community events).	NO (see explanation at left)

Town of East Haven – Status of Prior Mitigation Actions					
Action #	**Action Title**	**Action Description**	**Current Status**	**Status Description / Explanation**	**Keep for Plan Update?**
31	FLOODING RECOMMENDATIONS - Property Protection	Make necessary changes to the Zoning Regulations so that all insured residents can be eligible for additional mitigation coverage (ICC).	Delayed	The Town has not been able to get to this activity yet, but it will continue to pursue it as necessary based on additional review and research into required changes to existing zoning regulations.	YES (see Action #14)
32	FLOODING RECOMMENDATIONS - Property Protection	Provide technical assistance to owners of non-residential structures that suffer flood damage regarding floodproofing measures.	Completed + To Be Continued	Existing capability and ongoing activity (the Town Engineer meets with non-residential property owners at their request and offers advice on each particular instance. The Engineering office vets all plans and makes comments/instruction to builders.)	NO (see explanation at left)
33	FLOODING RECOMMENDATIONS - Property Protection	Pursue elevation of residential properties that suffer flood damage; RLPs should be prioritized as the Town has done in the past.	Delayed	The Town was not eligible for funds this cycle. The Town advises elevation during reconstruction and requires FEMA standards.	YES (see Action #17)
34	FLOODING RECOMMENDATIONS - Property Protection	Pursue acquisition/demolition of flood prone properties for open space as noted under "Natural Resource Protection." RLPs should be prioritized.	Delayed	The Town was not eligible for funds this cycle.	YES (see Action #15)
35	FLOODING RECOMMENDATIONS - Property Protection	Re-apply and join the CRS program at Class 8 or better.	Delayed	The Town will be re-applying during the Spring of 2018.	YES (see Action #4)
36	FLOODING RECOMMENDATIONS - Public Education	Continue the Natural Hazards Awareness Week.	Partially Completed / In Progress	The Town is currently studying the materials available to design a local program.	YES (see Action #9)
37	FLOODING RECOMMENDATIONS - Public Education	During the Natural Hazards Awareness Week, conduct an annual "Flood Fair".	Completed + To Be Continued	Existing capability and ongoing activity (the Town will do this annually during Fall Festival).	NO (see explanation at left)
38	FLOODING RECOMMENDATIO	Continue to visit schools and educate children about the risks of floods (and other	Completed	Existing capability and ongoing activity (this was done on November 12, 2017 and will be done annually).	NO (see explanation at left)

Town of East Haven – Status of Prior Mitigation Actions					
Action #	**Action Title**	**Action Description**	**Current Status**	**Status Description / Explanation**	**Keep for Plan Update?**
	NS - Public Education	natural hazards) and how to prepare for them.			
39	FLOODING RECOMMENDATIONS - Public Education	Expand the annual public outreach projects, which cover the repetitive loss properties, to all properties in the entire community.	Completed + To Be Continued	Existing capability and ongoing activity (the Town attempts to educate all residents concerning the dangers of flooding and the costs involved. Outreach plans expand as the budget and manpower allow.)	NO (see explanation at left)
40	FLOODING RECOMMENDATIONS - Public Education	Re-establish a relationship with the Farm River Homeowners Association and develop a workshop to educate residents in floodproofing.	Delayed	The Town will begin new outreach efforts in Spring 2018. Town just removed 225 homes (remapping)	YES (see Action #38)
41	FLOODING RECOMMENDATIONS - Public Education	Develop a Newcomer's Club so that new residents may receive flood preparedness information.	Delayed	The Engineering office is developing a program for new residents for next year	YES (see Action #26)
42	FLOODING RECOMMENDATIONS - Public Education	Organize a meeting with East Haven insurance agents and the NFIP representatives from insurance contractors to educate agents on the program.	Cancelled	The Town has no plan at present to address this recommendation.	NO (see explanation at left)
43	FLOODING RECOMMENDATIONS - Public Education	Encourage builders, developers, and architects to become familiar with the NFIP land use and building standards by attending annual workshops.	Delayed	The Town has yet to develop the "workshop" curriculum but will develop and implement an annual workshop over 2018-2019.	YES (see Action #39)
44	FLOODING RECOMMENDATIONS - Public Education	Staff from appropriate town offices will attend the DEEP and other training workshops such as the EMI workshops.	Partially Completed / In Progress	Existing capability and ongoing activity (the Town has hosted state-sponsored training workshops and representatives attend all mitigation-themed events whenever possible).	NO (see explanation at left)
45	FLOODING RECOMMENDATIONS - Public Education	The East Shore Health District (ESHD) will continue to develop a neighborhood buddy system for neighbors to assist neighbors during emergencies.	Completed	Existing capability and ongoing activity (ESHD is regularly engaged).	NO (see explanation at left)

Town of East Haven – Status of Prior Mitigation Actions					
Action #	**Action Title**	**Action Description**	**Current Status**	**Status Description / Explanation**	**Keep for Plan Update?**
46	FLOODING RECOMMENDATIONS - Public Education	Continue to post flood related information on the fire department's web page.	Completed	Existing capability and ongoing activity (this is done annually).	NO (see explanation at left)
47	FLOODING RECOMMENDATIONS - Natural Resource Protection	Pursue the acquisition of additional municipal open space in SFHAs.	Delayed	The Town was not eligible for funds this cycle.	YES (see Action #32)
48	FLOODING RECOMMENDATIONS - Natural Resource Protection	Selectively pursue conservation recommendations listed in the Plan of Conservation and Development.	Completed + To Be Continued	Existing capability and ongoing activity (the Zoning office and Economic Development use the plan regularly in the course of new development).	NO (see explanation at left)
49	FLOODING RECOMMENDATIONS - Natural Resource Protection	Identify new funding sources for open space acquisition.	Partially Completed / In Progress	Existing capability and ongoing activity (the Town is always looking for funding sources).	NO (see explanation at left)
50	FLOODING RECOMMENDATIONS - Natural Resource Protection	Continue to regulate development in protected and sensitive areas, including steep slopes, wetlands, and floodplains	Completed + To Be Continued	Existing capability and ongoing activity (zoning applications require review for compliance with all applicable regulations with regards to sensitive areas such as wetlands, floodplains, and steep slopes. We stringently control development in flood-prone and wetland areas).	NO (see explanation at left)
51	FLOODING RECOMMENDATIONS - Natural Resource Protection	Continue to aggressively pursue wetlands protection through existing wetlands regulations. Incorporate performance standards.	Completed + To Be Continued	Existing capability and ongoing activity (the Town is very proactive in protecting the wetlands).	NO (see explanation at left)
52	FLOODING RECOMMENDATIONS - Natural	Pursue acquisition/demolition of flood prone properties for open space as noted above. RLPs should be prioritized.	Delayed	The Town was not eligible for funds this cycle.	YES (see Action #15)

Town of East Haven – Status of Prior Mitigation Actions					
Action #	**Action Title**	**Action Description**	**Current Status**	**Status Description / Explanation**	**Keep for Plan Update?**
	Resource Protection				
53	FLOODING RECOMMENDATIONS - Structural Projects	Continue to maintain a dialog with regulatory agencies, FEMA, and other entities regarding the possibilities for flood control structures such as a dam in North Branford.	Completed + To Be Continued	Existing capability and ongoing activity (the Town is in constant contact with the State DEEP and our NFIP liaison, as well as other agencies and groups involved. Town has submitted various mitigation structure both coastal and riverine, for funding over the last several years (CIRCA, etc.)).	NO (see explanation at left)
54	FLOODING RECOMMENDATIONS - Structural Projects	Continue to use modeling techniques to evaluate different flood mitigation options along the Farm River including floodplain storage, channel clearing, diversions, berms, dikes, bridge replacement, and culvert replacement as well as home elevations and acquisitions.	Completed + To Be Continued	We have already replaced the bridges and do ongoing maintenance in the river. The Town will continue using the modeling techniques and new data as it becomes available to evaluate additional flood mitigation activities.	YES (see Action #33)
55	FLOODING RECOMMENDATIONS - Emergency Services	Identify funding sources and install staff gauges in smaller streams such as Tuttle Brook.	Delayed	Engineering Department is still studying this issue.	YES (see Action #18)
56	FLOODING RECOMMENDATIONS - Emergency Services	Revise and update the East Haven Flood Response Plan. This would complement the EOP.	Partially Completed / In Progress	Working with SCRCOG on regional plan.	YES (see Action #10)
57	FLOODING RECOMMENDATIONS - Emergency Services	Investigate locations and necessary labor involvement for the pre-event stockpiling of sand bags for use in the flood prone downtown areas.	Partially Completed / In Progress	Will work with DPW on this.	YES (see Action #11)
58	FLOODING RECOMMENDATIONS - Emergency Services	Pursue mutual aid agreements with organizations to provide labor during flooding to fill sand bags and assist with other response activities.	Delayed	Will work with Branford on a MA agreement with their DPW.	YES (see Action #19)

Town of East Haven – Status of Prior Mitigation Actions					
Action #	**Action Title**	**Action Description**	**Current Status**	**Status Description / Explanation**	**Keep for Plan Update?**
59	FLOODING RECOMMENDATIONS - Emergency Services	Investigate and pursue the purchase of an automated sand bagger by the town.	Delayed	Currently no funding available, but the Town will be eligible for grant monies after the regional Hazard Mitigation Plan is submitted.	YES (see Action #27)
60	ADDITIONAL RECOMMENDATIONS FOR COASTAL FLOODING - Emergency Services	Implement a roadway-specific warning system to alert motorists to dangers at the Coe/Hemingway/Short Beach Road intersection during flooding.	Cancelled	The roadway is being retrofitted/mitigated (this intersection is being elevated).	NO (see explanation at left)
61	ADDITIONAL RECOMMENDATIONS FOR COASTAL FLOODING - Property Protection - General	Apply freeboard standards of 1 foot when requiring structure elevations for renovations and new construction in coastal A zones and V zones.	Completed + To Be Continued	Existing capability and ongoing activity (the Town Engineer applies the freeboard to elevation and new construction in the flood zone).	NO (see explanation at left)
62	ADDITIONAL RECOMMENDATIONS FOR COASTAL FLOODING - Structural Projects	Investigate funding sources and feasibility of improvements to Coe Ave, Hemingway Rd, and Short Beach Rd intersection to mitigate flooding.	Partially Completed / In Progress	Project underway through CDBG-DR Grant (Town awarded $1,241,831 for Hemingway and Cove Avenue Reconstruction). The project will raise the road elevation to provide an evacuation route during storm emergencies and connect the Emergency Service Headquarters with the shoreline area so that emergency vehicles have access during storm emergencies. Highway and pedestrian safety also are a focus.	YES (see Action #5)
63	ADDITIONAL RECOMMENDATIONS FOR COASTAL FLOODING - Structural Projects	Investigate funding sources and feasibility of elevating portions of Town-owned roads with an emphasis on those needed for inland evacuation.	Delayed	Funding in place for State Road elevation. Until the Mitigation plan is complete, we cannot apply for these funds.	YES (see Action #6)

Town of East Haven – Status of Prior Mitigation Actions					
Action #	**Action Title**	**Action Description**	**Current Status**	**Status Description / Explanation**	**Keep for Plan Update?**
64	ADDITIONAL RECOMMENDATIONS FOR COASTAL FLOODING - Structural Projects	Upgrade stormwater collection and discharge systems in downtown and coastal East Haven to keep up with rising sea level	Partially Completed / In Progress	Currently replacing the worst of our storm drainage in the downtown area. Public Works upgraded many stormwater drainage points during the Fall Paving program, and we are currently investigating other drainage improvements.	YES (see Action #7)
65	ADDITIONAL RECOMMENDATIONS FOR COASTAL FLOODING - Erosion Control	Conduct beach nourishment along Cosey Beach as needed to keep up with erosion.	Completed	The Town hauled in 250 tons of sand several years ago, not yet needed again.	NO (see explanation at left)
66	ADDITIONAL RECOMMENDATIONS FOR COASTAL FLOODING - Erosion Control	Maintain existing hard structures in good condition.	Completed + To Be Continued	Existing capability and ongoing activity.	NO (see explanation at left)
67	WIND DAMAGE RELATED TO HURRICANES, SUMMER STORMS, AND WINTER STORMS	During the Natural Hazards Awareness Week, conduct an annual workshop regarding wind associated risks, retrofitting techniques, etc.	Delayed	The program is in the development stage.	YES (see Action #20)
68	WIND DAMAGE RELATED TO HURRICANES, SUMMER STORMS, AND WINTER STORMS	Continue to visit schools to educate children about the risks of wind events (and other natural hazards) and how to prepare for them.	Completed + To Be Continued	Existing capability and ongoing activity (this is done during annual fire prevention week).	NO (see explanation at left)
69	WIND DAMAGE RELATED TO HURRICANES, SUMMER STORMS, AND WINTER STORMS	The Building Department will make information on wind construction techniques (such as hurricane straps) available to building permit applicants.	Completed + To Be Continued	Existing capability and ongoing activity (this is routinely done, and literature is available as needed).	NO (see explanation at left)

Town of East Haven – Status of Prior Mitigation Actions					
Action #	**Action Title**	**Action Description**	**Current Status**	**Status Description / Explanation**	**Keep for Plan Update?**
70	WIND DAMAGE RELATED TO HURRICANES, SUMMER STORMS, AND WINTER STORMS	Promote the use of shutters for properties located along the coast to guard against window breakage which can result in structural failure.	Completed + To Be Continued	Town sponsored a cost-share in the past, will investigate that possibility again.	YES (see Action #12)
71	WIND DAMAGE RELATED TO HURRICANES, SUMMER STORMS, AND WINTER STORMS	Develop working relationships with clubs and encourage organizations to sponsor events to educate the public on wise landscaping techniques.	Cancelled	There are currently no clubs in town this would apply to.	NO (see explanation at left)
72	WIND DAMAGE RELATED TO HURRICANES, SUMMER STORMS, AND WINTER STORMS	Continue to apply the landscaping standards of the Zoning Regulations during the review of new subdivisions and commercial projects.	Completed + To Be Continued	Existing capability and ongoing activity (landscaping plans are a required element of applications requiring a site plan application. The Planning and Zoning Commission reviews the applications for compliance.)	NO (see explanation at left)
73	WIND DAMAGE RELATED TO HURRICANES, SUMMER STORMS, AND WINTER STORMS	Continue to require the burying of utility lines for subdivisions and encourage lines to be buried for other projects where appropriate.	Completed + To Be Continued	Existing capability and ongoing activity (zoning regulations require utilities be underground wherever possible).	NO (see explanation at left)
74	WIND DAMAGE RELATED TO HURRICANES, SUMMER STORMS, AND WINTER STORMS	Identity a location in each of the four quadrants of town for a brush disposal operation for dealing with debris after wind storms.	Completed + To Be Continued	Existing capability and ongoing activity (the Town is always updating and improving our internal plans and operations).	NO (see explanation at left)
75	WIND DAMAGE RELATED TO HURRICANES, SUMMER STORMS,	Request that the Town and the Board of Education (BOE) conduct engineering surveys for shelters; recommend improvements if necessary.	Partially Completed / In Progress	BOE maintains the High School which is our primary shelter.	YES (see Action #28)

Town of East Haven – Status of Prior Mitigation Actions					
Action #	**Action Title**	**Action Description**	**Current Status**	**Status Description / Explanation**	**Keep for Plan Update?**
	AND WINTER STORMS				
76	WIND DAMAGE RELATED TO HURRICANES, SUMMER STORMS, AND WINTER STORMS	Prioritize any wind-related retrofitting, given those buildings to be used as shelters the highest priority.	Delayed	Delayed until Town is eligible for funding. Once funding sources become available, we will begin the public outreach on this.	YES (see Action #16)
77	WIND DAMAGE RELATED TO HURRICANES, SUMMER STORMS, AND WINTER STORMS	Encourage owners of buildings with large population clusters to develop emergency response plans and identify mitigation opportunities.	Delayed	Have not undertaken this specific action but encouraging emergency response plans for large buildings or facilities is an existing capability and ongoing activity for the Town.	NO (see explanation at left)
78	WIND DAMAGE RELATED TO HURRICANES, SUMMER STORMS, AND WINTER STORMS	Work through the State to locate NOAA weather radios in commercial buildings with large population clusters.	Partially Completed / In Progress	We are reaching out to the State at this time - program will hopefully be supplied in early 2018.	YES (see Action #29)
79	WIND DAMAGE RELATED TO HURRICANES, SUMMER STORMS, AND WINTER STORMS	Implement a Marina Management Plan addressing wind damage mitigation. Share that plan with the other marinas and yacht clubs.	Cancelled	Marina is closed.	NO (see explanation at left)
80	WINTER STORMS	Conduct a study to identify municipal buildings, critical facilities, and others that are vulnerable to roof damage or collapse due to heavy snow.	Partially Completed / In Progress	Existing capability and ongoing activity (in the course of upkeep, DPW has attempted to assess the various risks to Town Roofs. This is not a separate study, but rather embedded in the Town's routine inspections and maintenance schedule).	NO (see explanation at left)

Town of East Haven – Status of Prior Mitigation Actions					
Action #	**Action Title**	**Action Description**	**Current Status**	**Status Description / Explanation**	**Keep for Plan Update?**
81	WINTER STORMS	Develop a plan to prioritize snow removal from the roof of municipal buildings (especially critical facilities) and have funding available for clearing.	Partially Completed / In Progress	Action completion is contingent on funding that is not available at this time.	YES (see Action #34)
82	WINTER STORMS	Consider posting the plowing routes in municipal buildings and the town website so residents and business owners may better understand risks.	Delayed	Delayed due to the Town's current review and update process for the Plow Routes.	YES (see Action #40)
83	WINTER STORMS	Identify areas that are difficult to access during winter storm events and develop contingency plans.	Partially Completed / In Progress	This data will be generated from the review and updating process for our storm routes.	YES (see Action #8)
84	WINTER STORMS	Provide information for mitigating icing, insulating pipes, and retrofits for flat roofed buildings.	Completed + To Be Continued	Existing capability and ongoing activity (retro-fitting information is always made available, and situation specific advice is always available).	NO (see explanation at left)
85	EARTHQUAKES	Consider preventing residential development in areas prone to collapse such as below steep slopes, or in areas prone to liquefaction.	Cancelled	There are no know areas of Town prone to liquefaction.	NO (see explanation at left)
86	EARTHQUAKES	Continue to require adherence to the state building codes.	Completed + To Be Continued	Existing capability and ongoing activity.	NO (see explanation at left)
87	EARTHQUAKES	Ensure that municipal departments have backup facilities for continued function in case earthquake damage occurs to critical facilities.	Cancelled	The Town continues to establish backup power and secondary facilities as needed but preparing for earthquakes is not considered a high priority at this time.	NO (see explanation at left)
88	EARTHQUAKES	Ensure that municipal departments and critical facilities have adequate backup power supply generation capabilities.	Partially Completed / In Progress	The Emergency 911 Center and EOC are now adequately equipped.	YES (see Action #21)
89	DAM FAILURE	Include dam failure areas in the Everbridge emergency contact database	Partially Completed / In Progress	Still working on updating Everbridge database, but this should be considered an ongoing activity.	NO (see explanation at left)

Town of East Haven – Status of Prior Mitigation Actions					
Action #	**Action Title**	**Action Description**	**Current Status**	**Status Description / Explanation**	**Keep for Plan Update?**
90	DAM FAILURE	Develop a specific EOP for the Grannis Pond Dam.	Delayed	Project delayed but this is still a work in progress. Removing from plan as this is not a high hazard dam and not associated with a mitigation action.	NO (see explanation at left)
91	DAM FAILURE	Develop a specific EOP for the two Alling Memorial Golf Course dams.	Cancelled	This is typically a New Haven response, and outside of Town's authority.	NO (see explanation at left)
92	DAM FAILURE	Develop a specific EOP for the Thompson Pond Dam.	Delayed	Project delayed but this is still a work in progress. Removing from plan as this is an insignificant water body and not associated with a mitigation action.	NO (see explanation at left)
93	DAM FAILURE	Provide technical assistance and outreach to owners of unregistered dams regarding inspections and maintenance.	Completed + To Be Continued	Existing capability and ongoing activity (Engineering Department advises individually on these issues).	NO (see explanation at left)
94	WILDFIRES	Continue to support public outreach programs to increase awareness of forest fire danger, equipment usage, and protecting homes from wildfires	Completed + To Be Continued	Existing capability and ongoing activity (this is done at the annual Fall Festival on the town green and during FP week).	NO (see explanation at left)
95	WILDFIRES	Ensure that provisions of the Subdivision Regulations regarding fire protection facilities are being enforced.	Completed + To Be Continued	Existing capability and ongoing activity (development applications are referred to the Fire Marshal's Office for comment).	NO (see explanation at left)
96	WILDFIRES	Extend public water supply and fire protection to areas of Bradley Street that are not served by the public water supply.	Delayed	Funding delays this and is under care of NHRWA. Town will continue to pursue but not critical to keep in plan update.	NO (see explanation at left)
97	WILDFIRES	Pursue additional sources of fire-fighting water where adequate supplies do not exist.	Delayed	Funding delays this and is under care of NHRWA. Town will continue to pursue but not critical to keep in plan update.	NO (see explanation at left)
98	WILDFIRES	Continue to require than utilities be installed underground.	Completed + To Be Continued	Existing capability and ongoing activity (zoning regulations require utilities be underground wherever possible).	NO (see explanation at left)

GUILFORD

Town of Guilford – Status of Prior Mitigation Actions					
Action #	**Action Title**	**Action Description**	**Current Status**	**Status Description / Explanation**	**Keep for Plan Update?**
1	ALL HAZARDS - General Recommendations	Disseminate informational pamphlets regarding natural hazards to public locations	Completed + To Be Continued	The Town has done some of this; the information brochure will be updated and mailed out with the local paper in addition to posting on the Town's website.	YES (see Action #7)
2	ALL HAZARDS - General Recommendations	Add pages to Town website dedicated to citizen education and preparation for natural hazard events	Delayed	Project has been delayed but will be combined with Action 1 above in plan update.	YES (see Action #7)
3	ALL HAZARDS - General Recommendations	Using the LID checklist as a model, develop a checklist for permittees that cross-references regulations and codes related to disaster resilience	Cancelled	Planning and Zoning code update section 273-91 Coastal Site Plans Review updated to require elevation of buildings one foot above base flood elevation for high hazard zones and A zones. Coastal A zones are required to have the lowest horizontal member elevated to or above Base Flood Elevation.	NO (see explanation at left)
4	ALL HAZARDS - General Recommendations	Install a multidirectional emergency horn at Town Hall to replace the current fixed horn.	Cancelled	Emergency Manager determined horn was not a priority	NO (see explanation at left)
5	ALL HAZARDS - General Recommendations	Review and update the evacuation route map at least once annually and post it to the Town's web site	Completed	Evacuation Maps are located on the Emergency Management Page of the Town Web Site.	NO (see explanation at left)
6	ALL HAZARDS - General Recommendations	Acquire and install evacuation signs	Partially Completed / In Progress	Signs installed in Shoreline neighborhoods. Additional signs need to be ordered and installed directing the public to the high school.	YES (see Action #1)
7	ALL HAZARDS - General Recommendations	Encourage the public to register their mobile phones with the reverse 911 system.	Completed + To Be Continued	Due to the importance of communicating with the public the Town is trying to get as many people in town to register their mobile phones with the Towns Mass Notification System.	YES (see Action #2)
8	ALL HAZARDS - General Recommendations	Continue to review and update Emergency Operations Plan, at least once annually	Completed	Existing capability and ongoing activity.	NO (see explanation at left)

Town of Guilford – Status of Prior Mitigation Actions					
Action #	**Action Title**	**Action Description**	**Current Status**	**Status Description / Explanation**	**Keep for Plan Update?**
9	ALL HAZARDS - General Recommendations	Make the "Are You Ready" publications available at Town Hall and the Community Center.	Completed	Action complete.	NO (see explanation at left)
10	ALL HAZARDS - General Recommendations	Consider modifying the Subdivision Regulations to encourage two modes of egress into new neighborhoods	Cancelled	Town reconsidered, not a desired task.	NO (see explanation at left)
11	ALL HAZARDS - General Recommendations	Continue reviewing subdivision applications to ensure proper access for emergency vehicles	Completed + To Be Continued	Existing capability and ongoing activity.	NO (see explanation at left)
12	ALL HAZARDS - General Recommendations	Require that utilities be placed underground in new developments	Delayed	Hazard Mitigation Commission needs to work with the Planning and Zoning Commission to updates the regulations to require new developments to install the utilities underground.	YES (see Action #3)
13	ALL HAZARDS - General Recommendations	Pursue funding to place utilities underground in existing developments	Cancelled	Project determined to be too costly to implement.	NO (see explanation at left)
14	ALL HAZARDS - General Recommendations	Utilize the State's AlertNow service to its fullest capabilities	Completed	Existing capability and ongoing activity (service utilized by Emergency Services).	NO (see explanation at left)
15	ALL HAZARDS - General Recommendations	Encourage residents to purchase and use NOAA weather radio with an alarm feature	Cancelled	Item to be added to informational pamphlet (combined with Action #1).	NO (see explanation at left)
16	ALL HAZARDS - Specific Recommendations for Critical Facilities	Relocate the Public Works Facility outside a flood zone and hurricane surge zone	Delayed	Need to identify centrally located property outside flood hazard area to relocate the facility and approve funding for the relocation.	YES (see Action #19)
17	ALL HAZARDS - Specific Recommendations for Critical Facilities	Upgrade Guilford High School for use as one of two primary shelters	Completed	New High School has been constructed to meet hurricane standards. The building is currently noted to be the secondary shelter for minor storm events.	NO (see explanation at left)

Town of Guilford – Status of Prior Mitigation Actions					
Action #	**Action Title**	**Action Description**	**Current Status**	**Status Description / Explanation**	**Keep for Plan Update?**
18	ALL HAZARDS - Specific Recommendations for Critical Facilities	Upgrade the Community Center to improve its viability as one of two primary shelters	Partially Completed / In Progress	Need to contract with a structural engineer to inspect the building and create recommendations regarding the structural integrity of the building for different storm events.	YES (see Action #9)
19	ALL HAZARDS - Specific Recommendations for Critical Facilities	Consider floodproofing measures for the Fire station at 51 Water Street	Cancelled	Project cancelled due to fire apparatus can be relocated out of the flood zone.	NO (see explanation at left)
20	ALL HAZARDS - Specific Recommendations for Critical Facilities	Consider floodproofing measures for the Fire station at 120 Whitfield Street	Cancelled	Project cancelled due to fire apparatus can be relocated out of the flood zone.	NO (see explanation at left)
21	ALL HAZARDS - Specific Recommendations for Critical Facilities	Consider floodproofing measures for the Fire station at 10 Graves Avenue	Cancelled	Project cancelled due to fire apparatus can be relocated out of the flood zone.	NO (see explanation at left)
22	ALL HAZARDS - Specific Recommendations for Critical Facilities	Consider floodproofing measures for Apple Rehabilitation at 10 Boston Post Road	Cancelled	Private property (Town no longer considering).	NO (see explanation at left)
23	ALL HAZARDS - Specific Recommendations for Critical Facilities	Improve the driveway for Apple Rehabilitation as needed to ensure egress	Cancelled	Private property (Town no longer considering).	NO (see explanation at left)
24	ALL HAZARDS - Specific Recommendations	Develop a site-specific evacuation plan for Apple Rehabilitation	Cancelled	Facility has an evacuation plan.	NO (see explanation at left)

Town of Guilford – Status of Prior Mitigation Actions					
Action #	**Action Title**	**Action Description**	**Current Status**	**Status Description / Explanation**	**Keep for Plan Update?**
	for Critical Facilities				
25	ALL HAZARDS - Specific Recommendations for Critical Facilities	Consider floodproofing measures for The Gables at 201 Granite Road	Cancelled	Private property (Town no longer considering).	NO (see explanation at left)
26	ALL HAZARDS - Specific Recommendations for Critical Facilities	Elevate Granite Road as needed to ensure egress for The Gables	Cancelled	Potential flooding could occur along private driveway to facility.	NO (see explanation at left)
27	ALL HAZARDS - Specific Recommendations for Critical Facilities	Develop a site-specific evacuation plan for The Gables	Cancelled	Private property (Town no longer considering).	NO (see explanation at left)
28	ALL HAZARDS - Specific Recommendations for Critical Facilities	Consider floodproofing measures for Boston Terrace Senior Living at 41 Boston Terrace; and elevate	Cancelled	Residence can be evacuated.	NO (see explanation at left)
29	ALL HAZARDS - Specific Recommendations for Critical Facilities	Elevate Boston Terrace as needed to ensure egress for Boston Terrace Senior Living	Cancelled	Roadway is not impacted by flooding.	NO (see explanation at left)
30	ALL HAZARDS - Specific Recommendations for Critical Facilities	Develop a site-specific evacuation plan for Boston Terrace	Cancelled	Evacuation need to be determined by emergency declaration by First Selectman and under direction by Emergency Management Director. Residences would follow evacuation orders.	NO (see explanation at left)

Town of Guilford – Status of Prior Mitigation Actions					
Action #	**Action Title**	**Action Description**	**Current Status**	**Status Description / Explanation**	**Keep for Plan Update?**
31	ALL HAZARDS - Specific Recommendations for Critical Facilities	Develop an evacuation plan for Seaside Avenue residents	Cancelled	Evacuation need to be determined by emergency declaration by First Selectman and under direction by Emergency Management Director. Residences would follow evacuation orders.	NO (see explanation at left)
32	ALL HAZARDS - Specific Recommendations for Critical Facilities	Work with residents and the Town of Madison to develop an evacuation protocol for Guilford residents on Neck Road	Completed + To Be Continued	Existing capability and ongoing activity. Town of Guilford has mutual aid agreement with Town of Madison.	NO (see explanation at left)
33	ALL HAZARDS - Specific Recommendations for Critical Facilities	Ensure that the Town Marina has procedures and equipment to assist with watercraft removal before disasters	Completed	Town Marina Commission has a Severe Weather Plan.	NO (see explanation at left)
34	ALL HAZARDS - Specific Recommendations for Critical Facilities	Develop mutual aid agreement with Brown's Boat Yard to enable its assistance prior to disasters	Delayed	Was not a priority. Town needs to determine upland location for boat storage.	YES (see Action #20)
35	ALL HAZARDS - Specific Recommendations for Critical Facilities	Develop mutual aid agreement with Guilford Boat Yard to enable its assistance prior to disasters	Delayed	Was not a priority. Town needs to determine upland location for boat storage.	YES (see Action #21)
36	INLAND FLOODING - Prevention	Continue to regulate activities within SFHAs to the greatest extent possible with the Zoning and Subdivision Regulations	Completed + To Be Continued	Existing capability and ongoing activity. Planning and Zoning code update section 273-91 Coastal Site Plans Review updated to require elevation of buildings one foot above base flood elevation for high hazard zones and A zones. Coastal A zones are required to have the lowest horizontal member elevated to or above Base Flood Elevation.	NO (see explanation at left)

Town of Guilford – Status of Prior Mitigation Actions					
Action #	**Action Title**	**Action Description**	**Current Status**	**Status Description / Explanation**	**Keep for Plan Update?**
37	INLAND FLOODING - Prevention	Consider requiring new buildings in flood prone areas to be protected to the highest recorded flood level regardless of SFHA status	Completed + To Be Continued	Existing capability and ongoing activity. Planning and Zoning code update section 273-91 Coastal Site Plans Review updated to require elevation of buildings one foot above base flood elevation for high hazard zones and A zones. Coastal A zones are required to have the lowest horizontal member elevated to or above Base Flood Elevation.	NO (see explanation at left)
38	INLAND FLOODING - Prevention	Ensure that new buildings be designed and graded to shunt drainage away from the building	Completed + To Be Continued	Existing capability and ongoing activity.	NO (see explanation at left)
39	INLAND FLOODING - Prevention	Require developers to demonstrate whether detention or retention of storm water is the best option for reducing peak flows downstream	Completed + To Be Continued	Existing capability and ongoing activity.	NO (see explanation at left)
40	INLAND FLOODING - Property Protection for Repetitive Loss Properties	Provide technical assistance to owners of RLPs regarding floodproofing measures, or pursue elevation of structures	Cancelled	Item to be added to informational pamphlet in Action #1.	NO (see explanation at left)
41	INLAND FLOODING - Property Protection for Repetitive Loss Properties	Pursue acquisition and demolition of some of these properties for open space	Cancelled	Community Coastal Resilience Plan provides for options for acquisitions of properties. Most funding sources require multiple residences.	NO (see explanation at left)
42	INLAND FLOODING - Public Education	Consider enrolling in the Community Rating System	Partially Completed / In Progress	Assistant Town Engineer is working with FEMA staff with completing the application.	YES (see Action #10)
43	INLAND FLOODING - Public Education	Provide outreach regarding home elevation, flood barriers, dry and wet floodproofing, and other home improvement techniques	Cancelled	Item to be added to informational pamphlet in Action #1.	NO (see explanation at left)
44	INLAND FLOODING - Natural Resource Protection	Pursue the acquisition of additional municipal open space in SFHAs	Cancelled	Item noted in Community Coastal Resilience Plan.	NO (see explanation at left)

Town of Guilford – Status of Prior Mitigation Actions					
Action #	**Action Title**	**Action Description**	**Current Status**	**Status Description / Explanation**	**Keep for Plan Update?**
45	INLAND FLOODING - Natural Resource Protection	Selectively pursue conservation recommendations listed in the Plan of Conservation and Development and other studies and documents	Completed + To Be Continued	Existing capability and ongoing activity.	NO (see explanation at left)
46	INLAND FLOODING - Natural Resource Protection	Continue to regulate development in protected and sensitive areas, including steep slopes, wetlands, and floodplains	Completed + To Be Continued	Existing capability and ongoing activity.	NO (see explanation at left)
47	INLAND FLOODING - Structural Projects	Develop hydrologic and hydraulic model of the West River watershed as a way for to prioritize mitigation activities such as culvert and bridge upgrades, property acquisitions and elevations, and retention/detention	Delayed	Need to acquire funding to hire consultant.	YES (see Action #22)
48	INLAND FLOODING - Structural Projects	Upgrade bridges and culverts along West River south of Lake Quonnipaug	Delayed	Engineer still needs to design upgrades.	YES (see Action #23)
49	INLAND FLOODING - Structural Projects	Upgrade Route 1 bridge at West River	Cancelled	State Bridge (not under Town authority).	NO (see explanation at left)
50	INLAND FLOODING - Structural Projects	Stabilize slopes and lake edge along Route 77 to prevent further erosion of the road	Cancelled	State Road (not under Town authority).	NO (see explanation at left)
51	INLAND FLOODING - Structural Projects	Upgrade culverts along and under Route 77 southwest of the Fire station to prevent flooding and washout along a tributary of West River	Completed	State DOT Installed new culvert.	NO (see explanation at left)
52	INLAND FLOODING - Structural Projects	Conduct culvert maintenance along Sucker Brook near Lake Drive; work with private property owners as needed	Cancelled	Existing capability and ongoing activity (ongoing maintenance project).	NO (see explanation at left)
53	INLAND FLOODING - Structural Projects	Work with DEP to control beaver activity at the north end of Lake Quonnipaug and prevent flooding of Route 77	Cancelled	State Bridge (not under Town authority).	NO (see explanation at left)
54	INLAND FLOODING - Structural Projects	Install culverts to reduce flooding from a hillside near County Road and Route 77	Cancelled	State Bridge (not under Town authority).	NO (see explanation at left)

Town of Guilford – Status of Prior Mitigation Actions					
Action #	**Action Title**	**Action Description**	**Current Status**	**Status Description / Explanation**	**Keep for Plan Update?**
55	INLAND FLOODING - Structural Projects	Upgrade culverts to reduce flooding associated with the outlet stream from Menuckatuck Reservoir near 3300 Route 77	Cancelled	State Bridge (not under Town authority).	NO (see explanation at left)
56	INLAND FLOODING - Structural Projects	Upgrade culverts to reduce flooding along Race Hill Road associated with Hall Lot Brook or a West River tributary	Completed	New bridge installed on Race Hill Road.	NO (see explanation at left)
57	INLAND FLOODING - Structural Projects	Improve drainage and West River flood conveyance near Bittner Park	Cancelled	State Road (not under Town authority).	NO (see explanation at left)
58	INLAND FLOODING - Structural Projects	Improve drainage and Spinning Hill Brook flood conveyance in the area that floods near Martin Bishop Field and Long Hill Road	Completed	Road recently elevated and new culverts installed.	NO (see explanation at left)
59	INLAND FLOODING - Structural Projects	Determine whether flooding still occurs at the new bridge over Little Meadow Brook at Little Meadow Road	Completed	No flooding has occurred since new bridge was installed.	NO (see explanation at left)
60	INLAND FLOODING - Structural Projects	Improve drainage and Munger Brook flood conveyance in the area that floods between County Road and Route 80	Delayed	Project is a low priority due to the low frequency of flooding and the public can be detoured around the area. Project on boarder with North Branford and requires cooperation between towns.	YES (see Action #24)
61	COASTAL FLOODING - Emergency Services	Work with residents to develop a satellite shelter for residents that may become isolated in Sachems Head & Indian Cove during coastal flooding	Cancelled	Determined that shelters in evacuation area would provide false since of security to residences.	NO (see explanation at left)
62	COASTAL FLOODING - Emergency Services	Work with residents to develop a satellite shelter for residents that may become isolated in Mulberry & Tuttles Points during coastal flooding	Cancelled	Determined that shelters in evacuation area would provide false since of security to residences.	NO (see explanation at left)
63	COASTAL FLOODING - Emergency Services	Work with residents to develop a satellite shelter for residents that may become isolated in Leetes Island during coastal flooding	Cancelled	Determined that shelters in evacuation area would provide false since of security to residences.	NO (see explanation at left)

Town of Guilford – Status of Prior Mitigation Actions					
Action #	**Action Title**	**Action Description**	**Current Status**	**Status Description / Explanation**	**Keep for Plan Update?**
64	COASTAL FLOODING - Prevention	Continue to regulate activities within SFHAs to the greatest extent possible with the Zoning and Subdivision Regulations	Completed + To Be Continued	Existing capability and ongoing activity. Planning and Zoning code update section 273-91 Coastal Site Plans Review updated to require elevation of buildings one foot above base flood elevation for high hazard zones and A zones. Coastal A zones are required to have the lowest horizontal member elevated to or above Base Flood Elevation.	NO (see explanation at left)
65	COASTAL FLOODING - Property Protection - General	Apply freeboard standard of 1 foot when requiring structure elevations for renovations and new construction in coastal A zones	Completed + To Be Continued	Existing capability and ongoing activity. Planning and Zoning code update section 273-91 Coastal Site Plans Review updated to require elevation of buildings one foot above base flood elevation for high hazard zones and A zones. Coastal A zones are required to have the lowest horizontal member elevated to or above Base Flood Elevation.	NO (see explanation at left)
66	COASTAL FLOODING - Property Protection - General	Apply freeboard standard of 1 feet when requiring structure elevations for renovations and new construction in V zones	Completed + To Be Continued	Existing capability and ongoing activity. Planning and Zoning code update section 273-91 Coastal Site Plans Review updated to require elevation of buildings one foot above base flood elevation for high hazard zones and A zones. Coastal A zones are required to have the lowest horizontal member elevated to or above Base Flood Elevation.	NO (see explanation at left)
67	COASTAL FLOODING - Property Protection - General	Ensure that docks proposed in V zones conform to the design standards in 6.7.3(a) of the Harbor Management Plan	Cancelled	Docks are regulated by DEEP.	NO (see explanation at left)
68	COASTAL FLOODING - Property Protection - General	Ensure that transit-oriented development around the railroad station is flood disaster resistant and practical under sea level rise scenarios	Completed	Flood resistance is a requirement of the Flood Hazard Regulations and State regulations require that sea level rise be considered in all applications reviewed by Planning and Zoning Commissions.	NO (see explanation at left)

Town of Guilford – Status of Prior Mitigation Actions					
Action #	**Action Title**	**Action Description**	**Current Status**	**Status Description / Explanation**	**Keep for Plan Update?**
69	COASTAL FLOODING - Property Protection - General	Implement a review of shore protection features in the Harbor Sector to mitigate repeated loss of damage that was typical of TS Irene.	Cancelled	Item to be combined with Action #91 to #97.	YES (see Action #13)
70	COASTAL FLOODING - Property Protection for Repetitive Loss Properties	Provide technical assistance to owners of RLPs regarding floodproofing measures, or pursue elevation of structures	Cancelled	Item to be added to informational pamphlet in Action #1.	NO (see explanation at left)
71	COASTAL FLOODING - Property Protection for Repetitive Loss Properties	Pursue acquisition and demolition of some of these properties for open space	Cancelled	Community Coastal Resilience Plan provides for options for acquisitions of properties. Most funding sources require multiple residences.	NO (see explanation at left)
72	COASTAL FLOODING - Public Education	Maximize the Town's participation in the Nature Conservancy's Coastal Resilience Program	Completed	Nature Conservancy assisted the Town with the creation of the Town of Guilford Coastal Resilience Plan published May 30, 2014.	NO (see explanation at left)
73	COASTAL FLOODING - Public Education	Work with associations and neighborhood groups to facilitate their education of new property owners regarding coastal hazards and sea level rise	Cancelled	Covered with Educational Program.	NO (see explanation at left)
74	COASTAL FLOODING - Natural Resource Protection	Pursue the acquisition of additional municipal open space in coastal flood areas and hurricane surge zones	Cancelled	Community Coastal Resilience Plan provides for options for acquisitions of properties. Most funding sources require multiple residences.	NO (see explanation at left)
75	COASTAL FLOODING - Natural Resource Protection	Selectively pursue conservation recommendations listed in the Plan of Conservation and Development and other studies and documents	Completed	Existing capability and ongoing activity.	NO (see explanation at left)

Town of Guilford – Status of Prior Mitigation Actions					
Action #	**Action Title**	**Action Description**	**Current Status**	**Status Description / Explanation**	**Keep for Plan Update?**
76	COASTAL FLOODING - Natural Resource Protection	Continue to regulate development in protected and sensitive areas, including tidal wetlands and floodplains	Completed	Existing capability and ongoing activity.	NO (see explanation at left)
77	COASTAL FLOODING - Structural Projects	Elevate Route 146 at West River; upgrade bridge	Delayed	Creating combined strategy/action of working with CT DOT to mitigate flooding problems along Route 146.	YES (see Action #8)
78	COASTAL FLOODING - Structural Projects	Elevate Route 146 at Long Cove, provided that clearance below the railroad bridge is not jeopardized; upgrade culverts	Delayed	Creating combined strategy/action of working with CT DOT to mitigate flooding problems along Route 146.	YES (see Action #8)
79	COASTAL FLOODING - Structural Projects	Elevate Route 146 at Great Harbor/Hidden Lake; upgrade culverts	Delayed	Project currently under design by CT DOT.	YES (see Action #8)
80	COASTAL FLOODING - Structural Projects	Elevate Route 146 at Leetes Island; upgrade culverts	Delayed	Creating combined strategy/action of working with CT DOT to mitigate flooding problems along Route 146.	YES (see Action #8)
81	COASTAL FLOODING - Structural Projects	Elevate Whitfield Street from Seaview Terrace to the entrance of the marina to minimize flooding and improve drainage.	Delayed	Due to funding and priority. Need to create design plans	YES (see Action #25)
82	COASTAL FLOODING - Structural Projects	Elevate Daniel Avenue or West Lane to provide multiple modes of egress for Indian Cove residents	Delayed	Due to funding and priority. Need to create design plans	YES (see Action 11)
83	COASTAL FLOODING - Structural Projects	Elevate Tuttles Point Road to provide egress for Tuttles Point residents	Completed	Road Elevated.	NO (see explanation at left)
84	COASTAL FLOODING - Structural Projects	Elevate selected locations along Old Quarry Road	Completed	Road Elevated.	NO (see explanation at left)
85	COASTAL FLOODING - Structural Projects	Elevate low spots on Chimney Corner Road	Delayed	Need to work out impact issues with adjacent property owners. Then create designs plans.	YES (see Action #12)
86	COASTAL FLOODING - Structural Projects	Elevate Chaffinch Island Road as needed as long as Brown's Boat Yard remains a critical facility	Completed	Road Elevated.	NO (see explanation at left)

Town of Guilford – Status of Prior Mitigation Actions					
Action #	**Action Title**	**Action Description**	**Current Status**	**Status Description / Explanation**	**Keep for Plan Update?**
87	COASTAL FLOODING - Structural Projects	Elevate selected locations along Seaside Avenue	Delayed	Due to funding and priority. Need to Create design plans.	YES (see Action #16)
88	COASTAL FLOODING - Structural Projects	Upgrade stormwater collection and discharge systems along Whitfield Street and in Guilford Center to keep up with rising sea level	Completed	Road drainage improvements completed at Summer Street and Whitfield Street.	NO (see explanation at left)
89	COASTAL FLOODING - Structural Projects	Raise the entire bulkhead and seawall in the marina area.	Partially Completed / In Progress	Seawall completed along Moorings Restaurant. Additional work required along stone revetment to protect adjacent sidewalk and road.	YES (see Action #4)
90	COASTAL FLOODING - Erosion Control	Conduct beach nourishment at Jacob's Beach	Completed	Received sand from Superstorm Sandy.	NO (see explanation at left)
91	COASTAL FLOODING - Erosion Control	Consider extension of the breakwater near Jacob's Beach	Delayed	Conceptual design completed for Chittenden Beach living shoreline; this work was done as a component of the Regional Framework for Coastal Resilience. Additional study to be conducted for the other properties.	NO (see explanation at left)
92	COASTAL FLOODING - Erosion Control	Conduct study of erosion control alternatives at Jacobs Bch, Chittenden Bch, Grass Is., and Chaffinch Is; implement feasible/prudent alternatives	Partially Completed / In Progress	Conceptual design completed for Chittenden Beach living shoreline; this work was done as a component of the Regional Framework for Coastal Resilience. Additional study to be conducted for the other properties.	YES (see Action #13)
93	COASTAL FLOODING - Erosion Control	Consider construction of a new groin at Grass Island	Delayed	Conceptual design completed for Chittenden Beach living shoreline; this work was done as a component of the Regional Framework for Coastal Resilience. Additional study to be conducted for the other properties.	YES (see Action #13)
94	COASTAL FLOODING - Erosion Control	Consider replacing the old submerged groin at the east side of the mouth of the West River	Partially Completed / In Progress	Conceptual design completed for Chittenden Beach living shoreline; this work was done as a component of the Regional Framework for Coastal Resilience. Additional study to be conducted for the other properties.	YES (see Action #13)

Town of Guilford – Status of Prior Mitigation Actions					
Action #	**Action Title**	**Action Description**	**Current Status**	**Status Description / Explanation**	**Keep for Plan Update?**
95	COASTAL FLOODING - Erosion Control	Consider the use of wave attenuation structures offshore	Partially Completed / In Progress	Conceptual design completed for Chittenden Beach living shoreline; this work was done as a component of the Regional Framework for Coastal Resilience. Additional study to be conducted for the other properties.	YES (see Action #13)
96	COASTAL FLOODING - Erosion Control	Consider the use of dredged sediment for stabilizing marsh fronts such as those near Grass Island, Chittenden, and Chaffinch Island.	Partially Completed / In Progress	Conceptual design completed for Chittenden Beach living shoreline; this work was done as a component of the Regional Framework for Coastal Resilience. Additional study to be conducted for the other properties.	YES (see Action #13)
97	COASTAL FLOODING - Erosion Control	Consider the construction of a groin at Chaffinch Island point.	Delayed	Conceptual design completed for Chittenden Beach living shoreline; this work was done as a component of the Regional Framework for Coastal Resilience. Additional study to be conducted for the other properties.	YES (see Action #13)
98	COASTAL FLOODING - Erosion Control	Construct pile-supported walkways where foot traffic is exacerbating erosion	Partially Completed / In Progress	Completed at Chittenden Beach; Need to consider funding for Chaffinch Island.	YES (see Action #14)
99	COASTAL FLOODING - Erosion Control	Maintain existing hard structures in good condition	Completed + To Be Continued	Existing capability and ongoing activity.	NO (see explanation at left)
100	COASTAL FLOODING - Erosion Control	Set aside sufficient land for landward migration of tidal wetlands	Delayed	No shoreline properties with adjacent tidal wetlands have been on the market with an asking price that can be justified.	YES (see Action #27)
101	WIND DAMAGE RELATED TO HURRICANES, SUMMER STORMS, AND WINTER STORMS	Continue tree limb inspections and maintenance and outreach to private property owners regarding branches above powerlines	Completed	Existing capability and ongoing activity.	NO (see explanation at left)
102	WIND DAMAGE RELATED TO HURRICANES, SUMMER STORMS,	Increase funding for the Tree Warden to address a wider range of tree limb hazards than the current budget allows	Completed + To Be Continued	Continued decline of Sugar Maples and Ash Trees require additional funding for tree removal.	YES (see Action #5)

Town of Guilford – Status of Prior Mitigation Actions					
Action #	**Action Title**	**Action Description**	**Current Status**	**Status Description / Explanation**	**Keep for Plan Update?**
	AND WINTER STORMS				
103	WIND DAMAGE RELATED TO HURRICANES, SUMMER STORMS, AND WINTER STORMS	Develop a plan for addressing dead or dying trees near structures and roads	Cancelled	This is covered under the Town's Tree Ordinance.	NO (see explanation at left)
104	WIND DAMAGE RELATED TO HURRICANES, SUMMER STORMS, AND WINTER STORMS	Expand programs to bury power lines where feasible	Cancelled	Not a priority due to funding limitations.	NO (see explanation at left)
105	WIND DAMAGE RELATED TO HURRICANES, SUMMER STORMS, AND WINTER STORMS	Provide for the Building Department to make literature available during the permitting process regarding appropriate design standards for wind	Completed	Existing capability and ongoing activity.	NO (see explanation at left)
106	WIND DAMAGE RELATED TO HURRICANES, SUMMER STORMS, AND WINTER STORMS	Encourage the use of wind-mitigation structural techniques in new structures to protect new buildings to a greater level than the required standard	Cancelled	Current building code adequately addresses wind hazards.	NO (see explanation at left)
107	WINTER STORMS	Conduct a study to identify municipal buildings, critical facilities, and others that are vulnerable to roof damage or collapse due to heavy snow	Delayed	Contract structural engineer to review roofs of municipal buildings.	YES (see Action #15)
108	WINTER STORMS	Develop a plan to prioritize snow removal from the roof of municipal buildings (especially critical facilities) and have funding available for clearing	Cancelled	Existing capability and ongoing activity (work currently being performed by the Facilities Department and Board of Education).	NO (see explanation at left)

Town of Guilford – Status of Prior Mitigation Actions					
Action #	**Action Title**	**Action Description**	**Current Status**	**Status Description / Explanation**	**Keep for Plan Update?**
109	WINTER STORMS	Consider posting the snow plowing routes in municipal buildings and the town web site	Cancelled	Department determination.	NO (see explanation at left)
110	WINTER STORMS	Identify areas that are difficult to access during winter storm events and develop contingency plans	Cancelled	Areas are too variable and storm dependent.	NO (see explanation at left)
111	WINTER STORMS	Provide information for mitigating icing, insulating pipes, and retrofits for flat roofed buildings	Completed	Existing capability and ongoing activity.	NO (see explanation at left)
112	EARTHQUAKES	Consider preventing residential development in areas prone to collapse such as below steep slopes, or in areas prone to liquefaction	Cancelled	This is now covered under Town's Low Impact Development Guidelines.	NO (see explanation at left)
113	EARTHQUAKES	Continue to require adherence to the state building codes	Completed	Existing capability and ongoing activity.	NO (see explanation at left)
114	EARTHQUAKES	Ensure that municipal departments and critical facilities have adequate backup facilities in case damage occurs	Completed	Emergency Services have redundant capabilities between Emergency Dispatch Center, Police Station, and Emergency Operations Center.	NO (see explanation at left)
115	EARTHQUAKES	Conduct maintenance as necessary along Route 77 near Lake Quonnipaug to minimize rock slides	Cancelled	State Road.	NO (see explanation at left)
116	DAM FAILURE	Include dam failure areas in the Reverse 911 emergency contact database	Delayed	Need to work with emergency management.	YES (see Action #16)
117	DAM FAILURE	Work with Wallingford Water Department to develop a specific EOP for Lane's Pond Dam	Completed	All Class B and C dams now have EAPs in accordance with new State regulations.	NO (see explanation at left)
118	DAM FAILURE	Develop a specific EOP for Bartlett Pond Dam	Cancelled	All Class B and C dams now have EAPs in accordance with new State regulations.	NO (see explanation at left)
119	DAM FAILURE	Develop a specific EOP for West Lake Dam	Cancelled	All Class B and C dams now have EAPs in accordance with new State regulations.	NO (see explanation at left)

Town of Guilford – Status of Prior Mitigation Actions					
Action #	**Action Title**	**Action Description**	**Current Status**	**Status Description / Explanation**	**Keep for Plan Update?**
120	DAM FAILURE	Develop a specific EOP for the Guilford Lakes Dams	Cancelled	All Class B and C dams now have EAPs in accordance with new State regulations.	NO (see explanation at left)
121	DAM FAILURE	Reconstruct the main Guilford Lake Dam to contain overflow to the spillway and reduce overtopping/spillage nearby that affects private properties	Cancelled	All Class B and C dams now have EAPs in accordance with new State regulations.	NO (see explanation at left)
122	DAM FAILURE	Conduct formal inspections of Town-owned dams, especially Lake Quonnipaug Dam	Delayed	Due to funding and administrative capabilities.	YES (see Action #17)
123	DAM FAILURE	Provide technical assistance and outreach to owners of private Class B and Class C dams regarding inspections and maintenance	Delayed	Need to create literature for outreach.	YES (see Action #28)
124	DAM FAILURE	Evaluate and classify the seven unranked dams in Guilford	Delayed	Due to funding and administrative capabilities.	YES (see Action #29)
125	WILDFIRES	Continue to support public outreach programs to increase awareness of forest fire danger, equipment usage, and protecting homes from wildfires	Delayed	Need to begin work with Fire department on outreach program.	YES (see Action #30)
126	WILDFIRES	Ensure that amendments to the Subdivision Regulations regarding fire protection facilities are being enforced	Cancelled	Existing capability and ongoing activity.	NO (see explanation at left)
127	WILDFIRES	Extend public water supply and fire protection to Mulberry Point, Tuttles Point, and Indian Cove	Partially Completed / In Progress	Project has received town approval construction to start in 2018.	YES (see Action #6)
128	WILDFIRES	Pursue additional sources of fire-fighting water where adequate supplies do not exist	Partially Completed / In Progress	Existing capability and ongoing activity. Fire Chief continues to look at additional sources of water.	NO (see explanation at left)
129	WILDFIRES	Develop a program of phragmites control that minimizes burning and prevents uncontrolled burning	Partially Completed / In Progress	Working with CT DEEP with phragmite control projects.	YES (see Action #31)
130	WILDFIRES	Patrol Town-owned open space and parks to prevent campfires	Completed + To Be Continued	Existing capability and ongoing activity (Part time and Volunteer land stewards look out for campfire sites as they monitor trails. Several campfire sites have been removed.).	NO (see explanation at left)

Town of Guilford – Status of Prior Mitigation Actions					
Action #	**Action Title**	**Action Description**	**Current Status**	**Status Description / Explanation**	**Keep for Plan Update?**
131	WILDFIRES	Focus on the Westwoods area where a few wildfires have occurred	Completed	Existing capability and ongoing activity (Westwoods monitored by volunteer land stewards and with Mutual assistance the fire department has the resources to control the brush fires).	NO (see explanation at left)
132	WILDFIRES	Continue to promote inter-municipal cooperation in fire-fighting efforts	Completed	Have Mutual Aid Agreements.	NO (see explanation at left)
133	WILDFIRES	Develop a program for thinning of hemlocks where wildfire risk is greatest	Cancelled	Fallen Hemlocks have decayed.	NO (see explanation at left)
134	WILDFIRES	Enforce regulations and permits for open burning	Completed	Existing capability and ongoing activity (Fire Marshal's office enforces permits for open burning).	NO (see explanation at left)

HAMDEN

Town of Hamden – Status of Prior Mitigation Actions					
Action #	**Action Title**	**Action Description**	**Current Status**	**Status Description / Explanation**	**Keep for Plan Update?**
1	DPW Generator	Replace generator at Public Works garage.	Completed	Project complete.	NO (see explanation at left)
2	Tree Pruning	Tree pruning adjacent to power distribution wires.	Completed + To Be Continued	The Hamden Tree Commission and Town Tree Warden are coordinating with the UI Company to identify danger trees and address them in a manner which is agreeable to all parties.	YES (see Action #4)
3	FEMA Flood Study Update	Update FEMA flood study for Hamden.	Completed	Study was completed; however, floodplain residents are furious due to higher flood insurance rates. FEMA's update using LIDAR data was limited to the eastern section of town. The western part of town contains many inaccuracies that force residents to seek Letters of Map Amendment. An update of the remainder of the Town is needed.	YES (see Action #1)
4	Pardee Brook Box Culvert Project	Extend Pardee Brook Box culvert from south of School Street to Austen Road.	Delayed	Culvert never built due to lack of funding. Town undertook channel maintenance and the problem appears to be limited to Colonial Drive at this time. Need to clear tree roots and make possible modification of existing infrastructure in that area.	NO (see explanation at left)
5	Snow Load Study	Study town buildings to determine snow removal criteria.	Delayed	Former Town Engineer was not reappointed for 2016, so no work was done on this. Need to determine specifically who will be responsible for overseeing this study.	YES (see Action #5)
6	Raise Paradise Avenue South of Howard Drive	Raise Paradise Avenue south of Howard Drive.	Delayed	Still need to complete. This is the Town's biggest problem area, as the road completely floods over when it rains heavily. Raising the road is the only solution but the lack of funding remains a barrier to implementation.	YES (see Action #6)

MADISON

Town of Madison – Status of Prior Mitigation Actions					
Action #	**Action Title**	**Action Description**	**Current Status**	**Status Description / Explanation**	**Keep for Plan Update?**
1	Middle Beach Road Revetment	Rehabilitation of an approximate 750-foot-long stone revetment along Middle Beach Road.	Delayed	Town is engaged in a town wide Coastal Resilience Planning process (with the aid of consultant Milone & MacBroom). All proposed mitigation actions are undergoing additional evaluation prior to project start.	YES (see Action #6)
2	Garvin Point Bulkhead	Rehabilitation of an approximate 280-foot-long steel sheet pile bulkhead at Garvin Point.	Delayed	Town is engaged in a town wide Coastal Resilience Planning process (with the aid of consultant Milone & MacBroom). All proposed mitigation actions are undergoing additional evaluation prior to project start.	YES (see Action #7)
3	East River – Property Acquisition	Property acquisition of five residential homes north of I-95.	Cancelled	Upon further consideration by current town staff, the acquisition of the five residential homes north of I-95 is no longer being considered as a mitigation action. See status update for Action #5 below for more information.	NO (see explanation at left)
4	East River – Elevation of Buildings and Roadway	Elevation of buildings and roadway on south side.	Cancelled	Upon further consideration by current town staff, the elevation of buildings and roadway on south side is no longer being considered as a mitigation action. See status update for Action #5 below for more information.	NO (see explanation at left)
5	East River Roadway and Flood Control Structure	Roadway reconstruction and flood control structure construction adjacent to the East River.	Delayed	Upon further consideration by current town staff, installation of a flood control structure adjacent to the East River is the preferred mitigation action to address the hazard along the East River.	YES (see Action #8)
6	Radio Infrastructure Improvements	New dispatch consoles; microwave connectivity between towers; simulcast to allow communication for both towers simultaneously; new tower.	Partially Completed / In Progress	Project is 75% complete.	YES (see Action #1)

Town of Madison – Status of Prior Mitigation Actions					
Action #	**Action Title**	**Action Description**	**Current Status**	**Status Description / Explanation**	**Keep for Plan Update?**
7	Generator at Senior Center	Install generator at senior center to allow the center to serve some functions as an emergency shelter.	Cancelled	Upon further consideration by the Emergency Management Director, this action item has been modified to pursue installation of emergency generators at multiple Town and School facilities rather than just the Senior Center.	NO (see explanation at left)
8	Surf Club Dune Restoration	Restoration of coastal dune at Surf Club Recreation Facility.	Partially Completed / In Progress	Thirty percent of the conceptual design has been completed. Final design and permitting is needed, then construction. This action has been incorporated into the *Regional Framework for Coastal Resilience* as the Town of Madison's conceptual design.	YES (see Action #9)

MILFORD

City of Milford – Status of Prior Mitigation Actions					
Action #	**Action Title**	**Action Description**	**Current Status**	**Status Description / Explanation**	**Keep for Plan Update?**
1	300 KW Fuel Cell-Housatonic WWTP	Provide normal and emergency power supply to sewage treatment plant.	In Progress	Board of Alderman approved project with City & Doosan Fuel Cell America, Inc. 4/2/2018.	YES (see Action #1)
2	Wastewater Facilities Upgrade	Design and construction for upgrades of Housatonic and Beaver Brook Wastewater Treatment Plants and sanitary sewer collection systems. The project has already been financed by an appropriation of the Board of Aldermen.	Completed	Completed.	NO (see explanation at left)
3	Naugatuck/ Bridgeport Avenues Drainage	Alleviate flooding along Bridgeport Avenue and Naugatuck Avenue in the Devon Center Area. This will be achieved through a joint city and state project to increase the number of catch basins and to increase the size (capacity) of the drain pipes. Flooding has occurred for many years in the Devon center area as far as Church Street.	Completed	Completed.	NO (see explanation at left)
4	Egan Center Gymnasium Roof	To install a trussed roof with ventilation over the gymnasium portion of the building.	Delayed	Project postponed due to lack of funding & no longer needed for hazard mitigation, primary and secondary shelters have been established as Jonathan Law HS & Senior Center.	NO (see explanation at left)
5	Beach Erosion, Drainpipe Replacement, Sand Replenishment	Study and investigate erosion control, repair/replacement of shoreline storm drains and sand replenishment. This amount will be used to fund the study only.	Completed + To Be Continued	Army Corp work completed, estimated 5/13/2014. City is monitoring twice per year with surveys and maintenance is ongoing.	YES (see Action #2)
6	Town Dock (High Street) Repair and Renovate	Repair, shore-up and renovate the existing town dock which sits at the end of High Street at the Harbor.	Completed	Construction completed.	NO (see explanation at left)
7	Eisenhower Park Environmental/	Environmental reclamation, natural resource improvement, flood plain and water quality improvement, park maintenance and park	Delayed	On hold pending funding.	YES (see Action #23)

City of Milford – Status of Prior Mitigation Actions					
Action #	**Action Title**	**Action Description**	**Current Status**	**Status Description / Explanation**	**Keep for Plan Update?**
	Existing Renovations	security. No new facilities or amenities are contemplated.			
8	East Shore Middle School	Construction of addition and renovations to East Shore Middle School. Project will include removal of existing windows and replacement with full size insulated windows, roof replacements and various other renovations including intercom and clock systems upgrades.	Completed	Completed and no longer needed for hazard mitigation, primary and secondary shelters have been established as Jonathan Law HS & Senior Center.	NO (see explanation at left)
9	Harborside & West Shore Middle Schools Window Replacement	Removal of existing foam panels/windows and replace with full size insulated windows at both schools. This is an ongoing program of replacement of windows at all schools, which is nearing completion.	Completed	Completed and no longer needed for hazard mitigation, primary and secondary shelters have been established as Jonathan Law HS & Senior Center.	NO (see explanation at left)
10	Live Oaks/ Mathewson/ JFK/ Calf Pen/ Harborside/ West Shore Roof Replacement	Roof replacement at various schools.	Completed	Completed and no longer needed for hazard mitigation, primary and secondary shelters have been established as Jonathan Law HS & Senior Center.	NO (see explanation at left)
11	West Shore Middle School Addition, Renovation and Upgrades	Construction of addition and renovations to West Shore Middle School. Project includes general alterations and correction of code violations.	Partially Completed / In Progress	Construction partially complete, no longer needed for hazard mitigation, primary and secondary shelters have been established as Jonathan Law HS & Senior Center.	NO (see explanation at left)
12	Flax Mill Lane Bridge Repair	Rehabilitation and repairs to the deck, piers and abutments to the Flax Mill Lane Bridge over the Wepawaug River. The bridge was constructed in 1935 and has been identified as requiring work to maintain its structural integrity and aesthetic charm.	Partially Completed / In Progress	State of CT has hired Close Jensen & Miller and the project is in the design phase with Lochner. They are at 70% with drawings. Dependent on CT D.O.T. funds for bridge projects.	YES (see Action #24)
13	Tumble Brook Flood Control Study	Commission study to control flooding along Tumble Brook which flows approximately 3,000 lf. from the Orange town line to Route	Delayed	On hold pending funding.	YES (see Action #25)

City of Milford – Status of Prior Mitigation Actions					
Action #	**Action Title**	**Action Description**	**Current Status**	**Status Description / Explanation**	**Keep for Plan Update?**
		1 (Boston Post Road). Watershed encompasses over 500 acres of densely developed and populated area. Flooding occurs in heavy rains affecting many homes and flooding on Route 1.			
14	Wepawaug River Pond Dredging/ Dam and shore Rehabilitation	Dredge Wepawaug River Ponds (Eisenhower Park, North St. (upper) Duck Pond, City Hall (lower) Duck Pond, and Prospect Street Pond). Repair dams and shore walls. The ponds have been filled with silt and debris which threatens wildlife and habitats. Dredging, dam and shore repair has not been done in several decades.	Partially Completed / In Progress	Study design and permitting complete by Westcott & Mapes, Inc. City bonded approx. $2.1mm toward this project. Dredging contract awarded for 3 ponds (North, City Hall & Prospect St) to Millennium Builders. Mobilization November 2017.	YES (see Action #3)
15	Study Shoreline Beach Erosion, Drainpipe Replacement Sand Replenishment	Milford has approximately 17 miles of coastline. Many low-lying shoreline neighborhoods are prone to flooding and shoreline erosion. Many drainpipes are decades old and should be repaired or replaced and possibly fitted with "fishmouth" or "flapper" valves.	Partially Completed / In Progress	Various CDBG_DR projects are in progress. Projects are a mixture of Design and Permitting and Design Permitting and Construction.	NO (see explanation at left and actions 6-11, 13-14 & 18)
16	Silver Beach area	Sand Replenishment.	Delayed	New project resulting from Sandy and Irene storm damage. Work being done in cooperation with the Army Corps of Engineers. Army Corps is in preliminary benefit/cost analysis phase.	NO (see explanation at left)
17	Silver Sands State Park	Rebuilding training walls and flood gate to alter erosion patterns.	Completed	Project under state control - completed 2016.	NO (see explanation at left)
18	Gulf Beach	Gulf Beach-sand replenishment.	Partially Completed / In Progress	Annual maintenance by City.	YES (see Action #4)
19	Milford Harbor	Federal Channel dredging project.	Partially Completed / In Progress	Biological Testing of the sediments will occur winter 2017 - 2018.	YES (see Action #5)

City of Milford – Status of Prior Mitigation Actions					
Action #	**Action Title**	**Action Description**	**Current Status**	**Status Description / Explanation**	**Keep for Plan Update?**
20	Melba Street and Calf Pen Meadow Creek	Melba Street area was impacted by rain and wave action from Long Island Sound, but also by the Calf Pen Meadow Creek overflowing. Mitigation efforts would include cleaning the silt and debris out of the creek, allowing the water to flow into Long Island Sound.	Delayed	Minimal impacts were found to affect this area, outlet was cleaned from Melba St bridge to Long Island Sound with NRCS funding. The remainder of the creek needs to be addressed, to be placed under a new project for plan update.	NO (see explanation at left)
21	South Street/Hillside Avenue	The revetment at South Street/Hillside Avenue was damaged during the storm and a FEMA rebuilding project has been proposed for funding.	Completed	Construction completed.	NO (see explanation at left)
22	Wildemere Beach	Sand Replenishment.	Partially Completed / In Progress	CDBG-DR Grant awarded Walnut & Wildemere Beach Study for Resiliency and Stabilization. Design plan in progress by GEI and Milone & MacBroom. This project will provide hard and green infrastructure planning improvements to stabilize the shoreline. Construction is not part of this planning and permitting project.	YES (see Action #6)
23	Gulf Street bluff	The natural earth bluff was eroded by the storm. If it continues to erode, it will expose the underground utilities and endanger the asphalt road.	Partially Completed / In Progress	Gulf Street and Welchs Point Road Stabilization plan and permitting. This is a three-part project that includes a survey and analysis of the Gulf Beach shoreline, a planning stage, and a final design stage. Does not include construction.	YES (see Action #7)
24	Lisman Landing	Post Sandy reconstruction and repair of Lisman Landing, elevation of utilities.	Completed	This project will help made hard and green infrastructure improvements to stabilize the shoreline.	NO (see explanation at left)
25	Helwig Street Sewer Damage	Replacement of the Helwig Street manhole pump outside of the Flotilla building.	Completed	Construction completed.	NO (see explanation at left)
26	Develop a flood audit program (appendix A)	Develop a flood audit program town wide. Assessor currently evaluating neighborhoods for flood risk.	Delayed	Updated FEMA Flood Maps are the standard reference for flood prone properties.	NO (see explanation at left)

City of Milford – Status of Prior Mitigation Actions					
Action #	**Action Title**	**Action Description**	**Current Status**	**Status Description / Explanation**	**Keep for Plan Update?**
27	Bayview Beach drainage design	Engineering design project to improve storm drainage system and outfalls to alleviate flooding.	Partially Completed / In Progress	Milford's consultant is Fuss & O'Neill, Inc. (FANDO). They have prepared design recommendations that are under review by the City and the Flood Erosion and Control Board. Area residents are providing feedback during the design phases.	YES (see Action #8)
28	Creeland Avenue drainage design	Engineering design project to improve storm drainage system to alleviate flooding from city street onto private property.	Delayed	Creeland Ave. is outside the coastal flooding occurring in the Bayview Area.	NO (see explanation at left)
29	Beachland Avenue elevate road	Elevate roadways at Beachland Avenue to alleviate flooding.	Partially Completed / In Progress	Milford's consultant is Fuss & O'Neill, Inc. (FANDO). Elevate the lower portion of Beachland Avenue to mitigate flooding. Final design and permitting has been completed. Construction is anticipated to be completed by December 2018.	YES (see Action #9)
30	Town wide Flood zone warning system upgrade	Flood gauge and flood warning system upgrades town wide.	Delayed	Delayed due to lack of funding.	YES (see Action #26)
31	City Beach/Shoreline Mitigation Projects	Identify flood prone properties and develop flood mitigation projects including structural elevation, property acquisition and roadway/storm drain reconstruction.	Delayed	Coastal resilience plan/CRS plans. Includes construction which is under separately entered project(s). Some grants may require private funding match. Combined with project #26 CRS plan.	NO (see explanation at left)
32	Great Creek	Sediment removal in Great Creek.	Completed	Complete, done under WHAM program.	NO (see explanation at left)
33	Morningside Drive Pump Station	Repair of Morningside Drive pump station and flood mitigation improvements.	Completed	Completed.	NO (see explanation at left)
34	Generator Feasibility Study	City needs to investigate the viability of incorporating generator power to City facilities.	Delayed	Study complete, specific generators to be entered as new projects.	NO (see explanation at left)
35	IT Infrastructure	Where appropriate and when available the City needs to upgrade IT, mapping and	Delayed	Progress made, portions to be done.	YES (see Action #27)

City of Milford – Status of Prior Mitigation Actions					
Action #	**Action Title**	**Action Description**	**Current Status**	**Status Description / Explanation**	**Keep for Plan Update?**
		communications infrastructure and capabilities to mitigate and assess hazard risks and perform public outreach.			
36	Crescent Beach Resiliency	Analysis of resiliency options for the Woodmont Crescent Beach.	Partially Completed / In Progress	CDBG-DR, GEI Consultants (GEI) is the consultant on this design study project. The proposed project is a three-part project that will include a survey and analysis of Crescent Beach and the surrounding area, a planning stage, and a final design stage. Final Design and permit applications to CT DEEP, ACOE are anticipated in September 2018.	YES (see Action #10)
37	Pelham Street (Bay Street-paper street) public access resiliency	Analysis of resiliency options to protect public access at the base of the Bay Street (paper street).	Partially Completed / In Progress	Ocean and Coastal Consultants (COWI) has completed parcel surveys. Results to be discussed for options to proceed with City, COWI and DEEP.	YES (see Action #11)
38	Jonathan Law High School - Generator	Install generator to power critical emergency shelter operations at the J. Law High School.	Completed	CDBG-DR Project led by the BoE. Completed in 2017.	NO (see explanation at left)

NEW HAVEN

City of New Haven – Status of Prior Mitigation Actions					
Action #	**Action Title**	**Action Description**	**Current Status**	**Status Description / Explanation**	**Keep for Plan Update?**
1	Beach Nourishment South of Pardee Seawall	Beach nourishment in front of private homes on Townsend Avenue for flood prevention.	Partially Completed / In Progress	Construction is scheduled for 2018. This is a CDBG-DR grant funded project- $1.9M for design and construction.	YES (see Action #10)
2	Brewery Square Bulkhead (public)	Installation of sheet piling 18 inches outside of the existing seawall and restoration of the public walk area along the shore.	Partially Completed	Project completed.	NO (see explanation at left)
3	River Street Bulkhead	Shoreline stabilization along city property to prevent further erosion along the Quinnipiac River including sections of steel bulkhead and revetments with public access.	Partially Completed / In Progress	Concept plan developed by Roberge Associates. Study completed. Awaiting grants and permits for implementation. Lloyd Street project has permits. Design sketches were completed.	YES (see Action #11)
4	Long Wharf Park Shoreline Restoration	Repair damage to park from Superstorms Irene and Sandy. Restore to pre- Irene conditions.	Completed	Project completed.	NO (see explanation at left)
5	Long Wharf Park Shoreline Enhancement	Design a living shoreline to reduce wave energy and retain sediment while providing enhanced habitat value. This will be situated waterward of the restored shoreline.	Merged	Preliminary concept has been developed. Design funds will be sought from CIRCA or other entity. This project is now merged with Long Wharf Flood Protection Study listed below.	NO (see explanation at left)
6	Long Wharf Park Shoreline Enhancement	Construct a living shoreline to reduce wave energy and retain sediment while providing enhanced habitat value. This will be situated waterward of the restored shoreline.	Merged	Preliminary concept has been developed. Design funds will be sought from CIRCA or other entity. Construction will follow. This project is now merged with Long Wharf Flood Protection Study listed below.	NO (see explanation at left)
7	Long Wharf Flood Protection	A study to prepare storm surge and sea level rise model for the Long Wharf area to assess risk and propose protection and resilience strategies.	Completed	Study completed in March 2017. Four alternatives were proposed including hard and soft solutions. City prefers the living shoreline solution for the short term.	NO (see explanation at left)
8	Long Wharf Flood Protection	Implement flood protection recommendations from Long Wharf Flood Protection study including living shoreline,	Partially Completed / In Progress	Study completed but no funds identified yet for implementation.	YES (see Action #1)

City of New Haven – Status of Prior Mitigation Actions					
Action #	**Action Title**	**Action Description**	**Current Status**	**Status Description / Explanation**	**Keep for Plan Update?**
		deployable flood dams at I-95 underpasses, and planning and design of permanent flood wall.			
9	Downtown Stormwater Modeling and Drainage System Improvements Project	Hydraulic study of the Downtown area including Union Avenue and the Route 34 underpasses. The result of this study will inform the sewer system improvements to be made. The proposed alternative will be implemented through the design of another project that will be funded through CDBG-DR grant Tranche 2 (roughly $1.5 million allocated so far).	Completed + To Be Continued	This study was completed in March 2017. A follow-up study and design of the preferred alternative is underway with a $1.5M grant. The preferred alternative includes a 200 cfs pump station and force main to the New Haven Harbor. No funds identified yet for construction of the preferred alternative.	YES (see Action #12)
10	Downtown Green Infrastructure	Installation of green infrastructure within the downtown drainage area to alleviate pressure on the storm sewer system. Roughly 200 locations have been identified throughout the Downtown drainage area. This is considered Phase 2 of the Tranche 2 funding. Phase I is the implementation of the proposed alternative recommended in the Downtown Stormwater Modeling study. Of the $ 4million received in Tranche 2 funding, roughly $2.5 million will be used for installation of green infrastructure and the remaining for the implementation of the stormwater modeling study's recommended alternative.	Partially Completed / In Progress	Green infrastructure will be installed after the detailed stormwater modeling study has been completed. This project is in construction phase.	YES (see Action #2)
11	Church Street South Residential Planning and Demand Analysis	During Hurricane and other storm surges, excessive flooding occurs along Church Street South making it an extremely vulnerable community for residents and visitors. The scope of the Residential Planning and Demand Analysis will determine the most sustainable residential and mixed-use structure(s) to be developed	Partially Completed / In Progress	CDBG-DR Grant awarded in January 2016 for $500,000. The project will outline strategic goals for the redevelopment of a blighted and environmentally hazardous residential property. It will determine the most appropriate residential and mixed-use developments needed in the area and will make use of planning initiatives included in	YES (see Action #13)

City of New Haven – Status of Prior Mitigation Actions					
Action #	**Action Title**	**Action Description**	**Current Status**	**Status Description / Explanation**	**Keep for Plan Update?**
		based on the area's need and will leverage existing planning initiatives included in the storm water and flood mitigation studies as well as the Community Plan to determine a viable mix of housing and commercial developments for the redeveloped property.		existing storm water and flood mitigations studies. The plan will also evaluate current roadway design, potentially resulting in a new road and pedestrian corridor from Union Station to Church Street.	
12	Morris Cove Drainage Improvement Project	Redirection of existing drainage to improve conveyance of stormwater flow.	Partially Completed / In Progress	Preliminary designs have been developed for a relief sewer in Morris Causeway internally by the department.	YES (see Action #14)
13	Fort Hale Park Drainage Outlet Rehabilitation	Restoration and silt removal from an existing drainage channel. Requires access to the Armed Forces Reserve Center but would solve a drainage problem for residents near the USCG facility.	Partially Completed / In Progress	Draft design has been developed.	YES (see Action #15)
14	East Shore Park Shoreline Stabilization	Living Shoreline solutions are being studied, including: segmented sills with marsh fringe, regrading and vegetating waterfront slopes with armored toe, and improving public access to the waterfront.	Partially Completed / In Progress	Study underway.	YES (see Action #16)
15	East Shore Park Shoreline Stabilization	Living Shoreline solutions are being studied, including: segmented sills with marsh fringe, regrading and vegetating waterfront slopes with armored toe, and improving public access to the waterfront.	Partially Completed / In Progress	CDBG-DR Grant awarded for ($947,419 (East Shore Erosion Control). In an area seriously damaged by Super Storm Sandy, this project will construct a seawall to protect 10 homes in the low-lying residential area of the East Shore across Townsend Avenue and to a state-owned road. Design is underway.	NO (the bulkhead alternative has been shifted into a beach nourishment project.)
16	Criscuolo Park Seawall	Install wall along shoreline of park to prevent flooding of park.	Partially Completed / In Progress	Some preliminary concepts have been developed.	YES (see Action #17)

City of New Haven – Status of Prior Mitigation Actions					
Action #	**Action Title**	**Action Description**	**Current Status**	**Status Description / Explanation**	**Keep for Plan Update?**
17	Quinnipiac River Park Riprap Repairs	Repair of existing riprap and seawall.	Delayed	No work done to date.	YES (see Action #3)
18	Lighthouse Point Park Carousel Building Floodproofing Study	Conduct feasibility study to floodproof Carousel building to higher elevation in park to eliminate any future flooding of building.	Delayed	Preliminary exploration only.	YES (see Action #18)
19	Lighthouse Point Park Carousel Building Floodproofing	Floodproof existing Carousel Building to higher elevation in park to eliminate any future flooding of building.	Delayed	Preliminary exploration only.	YES (see Action #4)
20	Fort Hale Park Shoreline Stabilization	Install riprap and other shoreline stabilization measures.	Delayed	No work done to date.	YES (see Action #19)
21	City Point Flood Mitigation Study	A study to prepare storm surge and sea level rise model for the City Point area to assess risk and propose protection and resilience strategies.	Delayed	Study proposed to start in 2017. No work done to date.	YES (see Action #20)
22	City Point Flood Mitigation Measures Implementation	Implement recommendations of City Point flood mitigation study.	Delayed	Implementation of recommendations will be conducted upon the completion of the study.	YES (see Action #5)
23	CSO Clean Water Fund projects	Several projects proposed: 1. Installation of approximately 75 bioswales for CSO reduction within the West River Watershed 2. CSO Closure and Regulator Improvements at Quinnipiac/Clifton Street, George/Temple Street, and Mitchell Drive 3. Union Street and East Street Pump Station Upgrades 4. Yale Campus Trumbull Street Area Sewer Separation Phase 2A	Partially Completed / In Progress	New actions for 2016-2017 year. All projects to be complete by 2022.	YES (see Action #6)

City of New Haven – Status of Prior Mitigation Actions					
Action #	**Action Title**	**Action Description**	**Current Status**	**Status Description / Explanation**	**Keep for Plan Update?**
		5. West River CSO Improvements at Orange Street, Ella T. Grasso Boulevard, and Whalley Avenue 6. Union Street Downtown Crossing CSO Improvements 2018			
24	Mill River	Planning study to model storm surge and sea level rise within the Mill River Industrial District and then to assess three coastal zone management approaches: natural attenuation, intensive infrastructure investment and a balance of new infrastructure with attenuation.	Completed	Study completed. Project control devolved to individual property owners because of the high cost of integrated project.	NO (see explanation at left)
25	Mill River	Implement recommendations of the Mill River planning study that forecast storm surge and sea level rise within the Mill River Industrial District and then to assess three coastal zone management approaches: natural attenuation, intensive infrastructure investment and a balance of new infrastructure with attenuation.	Completed + To Be Continued	Study completed. Created new design standards for elevating vacant properties in the flood zone. Implementation is dependent on the commitment of individual property owners.	YES (see Action #7)
26	Dam failure drill with Regional Water Authority	Work with Regional Water Authority to complete a drill of potential failures of the West River, Whitney, and Maltby Dams which are all located upstream of the City.	Completed + To Be Continued	Action to be completed in fiscal year 2018-2019.	YES (see Action #8)
27	Implementation of CRS Program for Public Information	The City Plan Department must ensure that the City Plan Commission (acting as the PPI Committee) makes progress in the many action items in the PPI.	Partially Completed / In Progress	New action for 2016-2017. City distributed 13,500 copies of flood information brochures via residential property tax bills and also made these brochures available on the city website, main branch of local library, and at various City departments. Three public presentations were made in coastal areas of the city i.e., East Shore, Quinnipiac East, and Mill River. A news article on flood preparation was also released in July 2017 with links to flood information brochure and	YES (see Action #9)

City of New Haven – Status of Prior Mitigation Actions					
Action #	**Action Title**	**Action Description**	**Current Status**	**Status Description / Explanation**	**Keep for Plan Update?**
				other materials available on the City Plan webpage.	
28	City-Wide Tree Limb Inspection Program	The City has an existing program to address trees that may impact utility lines. The Citywide tree limb inspection program can be strengthened to ensure that the potential for downed power lines in diminished.	Cancelled	Existing capability and ongoing activity.	NO (see explanation at left)

NORTH BRANFORD

Town of North Branford – Status of Prior Mitigation Actions					
Action #	**Action Title**	**Action Description**	**Current Status**	**Status Description / Explanation**	**Keep for Plan Update?**
1	EOC (Town Hall) Stand-by Generator	Installation of stand-by generator to service Town Hall/EOC (future) during times of potential power outages due to severe weather.	Cancelled	EOC has been relocated to Police Station.	NO (see explanation at left)
2	Installation of Generator at Police Station	Installation of Replacement Stand-by Generator at North Branford Police Station.	Partially Completed / In Progress	Funding approved in 2017/2018 CIP.	YES (see Action #1)
3	Installation of Generator at Firehouse #1	Installation of Replacement Stand-by Generator at Company #1 Firehouse.	Partially Completed / In Progress	Funding approved in 2017/2018 CIP.	YES (see Action #2)
4	Tree Removal	Removal of trees alongside roads and power lines.	Partially Completed / In Progress	Some removal of dead/diseased trees has been completed by Town. Utility companies continue to remove hazard trees affecting overhead utility lines.	YES (see Action #3)
5	Farm River Flood Control Project	Construction of Farm River Flood Controls.	Delayed	Currently lacks funding and required political support, in addition to challenges associated with environmental constraints. Building a dam behind police station would help East Haven and North Branford – consideration should be given to a reduced project scope.	YES (see Action #4)
6	Public Education and Outreach	Increase public awareness regarding the potential for flooding, the areas to be affected, the need for and availability of flood insurance.	Partially Completed / In Progress	The Town has added more information to its revised website and continues to use social media for the purposes of increasing public awareness. Public is requesting evacuation plan and evacuation signage.	YES (see Action #5)
7	Open Space Acquisition	Open space acquisition.	Delayed	Lack of funding has delayed the project. Open space is also required when building a subdivision.	YES (see Action #11)
8	Removal or Elevation of Structures	Remove or elevate existing structures in flood prone areas.	Delayed	Town did acquire and demolish one home. Properties to be evaluated on case by case basis. Limited properties to be considered.	YES (see Action #6)

NORTH HAVEN

Town of North Haven – Status of Prior Mitigation Actions					
Action #	**Action Title**	**Action Description**	**Current Status**	**Status Description / Explanation**	**Keep for Plan Update?**
1	Emergency Generators	Emergency Generators.	Partially Completed / In Progress	The Town has upgraded generators at Town Hall and pump stations, but still needs to complete for garage and fire station. Police Department is also being renovated with a new generator.	YES (see Action #1)
2	Pine River Road Project	Pine River Road homes flood due to the Muddy River overflowing.	Delayed	Looking for funding sources for project.	YES (see Action #2)
3	Spring Road Project	Remedy the flooding of Spring Road due to Muddy River overflow.	Cancelled	This project should be cancelled and removed from the plan because it is not a priority for the Town, and the main impacts are limited to a horse farm.	NO (see explanation at left)
4	Patten Road Project	Remedy flooding of Patten Road due to the Muddy River.	Partially Completed / In Progress	Investigating funding sources for project. Now seeking to raise the roadway to remedy flooding issues caused by the Muddy River. A portion was completed by private developer.	YES (see Action #3)
5	Todd Drive Area Project	Remedy Todd Drive area flooding.	Completed	Drainage was installed in Todd Drive South and a 60" pipe was installed under Route 15 to reduce flooding in the Todd Drive area.	NO (see explanation at left)

ORANGE

Town of Orange – Status of Prior Mitigation Actions					
Action #	**Action Title**	**Action Description**	**Current Status**	**Status Description / Explanation**	**Keep for Plan Update?**
1	Old Grassy Hill Road Flooding	Reduce storm water flooding: Old Grassy Hill Road, water flows across road in heavy rain. Have had to close highly traveled road before.	Completed	Construction is complete.	NO (see explanation at left)
2	Generator for Indian River Road Sewer	Install a permanent generator for sewer pump station at 220 Indian River Road to prevent sewer from backing up during power outages.	Completed	Project was completed in 2016.	NO (see explanation at left)
3	Generator for Boston Post Road Sewer	Permanent generator for sewer pumps station at 538 Boston Post Road. Prevent sewers from backing up during power outages.	Cancelled	Can use a portable generator.	NO (see explanation at left)
4	Generator for Smith Farm Road Pump Station	Permanent generator for sewer pumps station at 352 Smith Farm Road. Prevent sewers from backing up during power outages.	Cancelled	Can use a portable generator.	NO (see explanation at left)
5	Tree Removal	Tree removal along roadsides. Town roads have trees hanging over roadways. Hurricane winds could cause massive road closures and power outages.	Partially Completed / In Progress	Tree maintenance is an ongoing issue. It is recommended to keep this sustained mitigation action in the plan to support continued implementation.	YES (see Action #1)

WALLINGFORD

Town of Wallingford– Status of Prior Mitigation Actions					
Action #	**Action Title**	**Action Description**	**Current Status**	**Status Description / Explanation**	**Keep for Plan Update?**
1	Generator at High School	Install emergency generator at the High School to support primary shelter.	Delayed	Due to lack of funding and unsuccessful attempts at securing grant funding for this project, there has been no progress with this project. The Town has applied for a STEAP Grant to assist in funding.	YES (see Action #4)
2	New Generator at Fire Headquarters	Replace the emergency generator at central Fire Headquarters.	Completed	Project has been completed.	NO (see explanation at left)
3	Upgrades to Cook Hill Shelter	Replace kitchen and install refrigerator at Cook Hill Emergency Management building to feed small shelter population and critical workers from town and private contractors.	Cancelled	Town does not use Cook Hill anymore. Delays in funding led to a change in plans. The Town now plans to relocate the shelter designation to a different building.	NO (see explanation at left)
4	Emergency Preparedness Webpage Project	Create webpage for emergency preparedness on Town Website. Include information on preparation and keeping debris from small streams to prevent street flooding.	Completed	Web page is now active on Town's website, which will continue to be improved with fresh content and additional links as needed.	NO (see explanation at left)
5	Generator at Well No. 1 Production Well	Install emergency generator at the Well No. 1 production well to maintain water supply to the Town's system during power outages.	Partially Completed / In Progress	Same as Well #3, work in progress – have full coverage across town.	YES (see Action #1)
6	New Generator at Pond Hill Pumping Station	Replace the emergency generator at the Pond Hill pumping station in order to maintain sanitary sewer pump station operation during power outages.	Completed	Project has been completed.	NO (see explanation at left)

WEST HAVEN

City of West Haven – Status of Prior Mitigation Actions					
Action #	**Action Title**	**Action Description**	**Current Status**	**Status Description / Explanation**	**Keep for Plan Update?**
1	Property Buyout 3rd Avenue Extension	Buy properties on 3rd Avenue Extension, Blohm Street in the Old Field Creek Floodplain and demolish houses.	Partially Completed / In Progress	Project is underway. First phase properties have been acquired (~12 properties), with plans to acquire 8 more. Second phase in progress. NRC may help fund beyond 2nd phase.	YES (see Action #7)
2	Beach Sand Nourishment and Dune Restoration	Beach sand nourishment and dune restoration.	Partially Completed / In Progress	Beach nourishment project has been completed; however, dune restoration work is still contingent on funding assistance. The City is promoting and recommending a sand reclamation project to retain and reuse local sand to the extent possible. The City is also in the process of completing two groin restoration projects at Prospect Beach. The Regional Framework for Coastal Resilience resulted in a conceptual design for this dune ridge but must still go through final design and permitting.	YES (see Action #8)
3	Bridge and Channel Improvement	Improve bridge and channel on Cove River at Painter Drive and West Main Street.	Delayed	Project was delayed due to lack of funding, but now underway. Western channel of Cove River is being improved to relieve eastern branch and reduce flooding. Project has been bid and contract awarded. Construction is expected to be complete in 2018.	YES (see Action #12)
4	Cove River Channel Study	Study, design and construct Cove River Channel and retention basins to reduce flooding at Greta Street & West Spring Street.	Delayed	Project has been delayed. Other projects have priority over this project.	YES (see Action 11)
5	Mechanized Tide Gate	Install mechanized tide gates at Captain Thomas Blvd. on Cove River.	Delayed	No funding available. Conceptual designs were prepared for the Coastal Resilience Plan, but still need to take the conceptual	YES (see Action #1)

City of West Haven – Status of Prior Mitigation Actions					
Action #	**Action Title**	**Action Description**	**Current Status**	**Status Description / Explanation**	**Keep for Plan Update?**
				design and prepare final design and permitting documents.	
6	Raise Beach Street	Raise roadway from Monahan Place to Second Avenue to provide access to Water Pollution Control Plant.	Partially Completed / In Progress	Due to higher estimated costs during design, both phases of funding have been reassigned to the first phase which will go to bid in early 2018. Second phase design is in progress and City is exploring funding for this phase. Project will be bid after funding is secured.	YES (see Action #4)

WOODBRIDGE

Town of Woodbridge – Status of Prior Mitigation Actions					
Action #	**Action Title**	**Action Description**	**Current Status**	**Status Description / Explanation**	**Keep for Plan Update?**
1	Merritt Avenue Bridge Replacement	Involves structure replacement to eliminate risk of deck closure due to scour potential during high water flow. It also eliminates a center pier that creates water flow restriction and debris collection.	Completed	Project was completed in May 2015. Bradley and Merritt Bridges are old and could flood and isolate commercial and residential district. Bridge was replaced eliminating center pier. No significant storm to witness true benefit of upper year storm events.	NO (see explanation at left)
2	Dam Removal at Lily Pond	Elimination of the Lily Pond Dam will reduce low storm year flood potential upstream in Woodbridge on West River.	Completed	Project complete. The dam was partially removed, and water flow has been restored. The dam was lowered six feet through funding assistance from the Department of Interior in the amount of $661,500 as part of Superstorm Sandy mitigation and recovery for Connecticut. Remedial work includes improvements to area as a Nature Preserve and restoration of fish migration capabilities. Construction began October 22, 2015 with work completion of Nature Preserve in the spring of 2016. The Town hasn't been able to determine the success of removal yet because it hasn't had sufficient rainfall to judge. It likely won't impact 100-year events but should mitigate flooding associated with smaller and less frequent storm events.	NO (see explanation at left)

REGIONAL MITIGATION PRIORITIES

To aid in the development and update of mitigation actions across the region, the Advisory Committee revisited and discussed the regional priorities for hazard mitigation as established in the initial (2014) plan. These priorities were reviewed, updated, and confirmed during the Committee's meeting on February 8, 2018 as listed in **Table 6-218** below. The priorities are listed along with their associated mitigation goal.

Table 6-218 Regional Mitigation Priorities

Goal Categories	Regional Mitigation Priorities
Community Planning	• Local zoning regulation changes (e.g. reducing allowable lot coverage and floor area) • Revise building codes
Flood Hazards	• Elevate roads • Floodgates on drainage systems • Erosion protection • Raise/elevate/floodproof buildings • Raise homes in floodplain
Trees	• Limit hazards to utility infrastructure • Clear trees off power lines • Support the preservation and proper care of healthy trees • Continue to work with CT DEEP and the Connecticut Agricultural Experiment Station to manage the Emerald Ash Borer
Regional Collaboration	• Regional coordination, planning and sharing of information, approaches and outcomes • Regional map of high-hazard places, in each town (parcel scale)
Public Awareness and Preparedness	• Equip all shelters with back-up power • Protect critical facilities and assets of regional significance • Protect historic and cultural resources (with support from CT SHPO) • Help small businesses mitigate impacts of natural hazards (with support from CT DEEP)

The Committee determined that while all the previous regional priorities as established under the initial plan should remain, the following additions were made to two goal categories:

Trees:

- *Support the preservation and proper care healthy trees*. This priority was added in response to stakeholder input and the Committee's recognition that healthy, native trees can help promote risk reduction to multiple natural hazards including severe storms, flooding, erosion, and extreme heat.
- *Continue to work with CT DEEP and the Connecticut Agricultural Experiment Station to manage the Emerald Ash Borer (EAB).* This priority was added due to the growing concern of several SCRCOG municipalities (Bethany, Hamden) with potential flooding impacts due to infested and dead ash trees that may obstruct rivers and drainage ways. Other associated hazards include high winds and wildfire, as the ash trees are more susceptible to damage and burning. The Emerald Ash Borer is an invasive beetle that has killed hundreds of millions of ash trees in North America since the late 1990s and, as noted in the risk

assessment, has caused considerable tree mortality in the western part of the South Central Region. According to CT DEEP, the EAB has been detected in all jurisdictions in the region.

Public Awareness and Preparedness:

- *Protect critical facilities and assets of regional significance.* This priority was added to help achieve more regional and multi-jurisdictional cooperation across the region as it relates to hazard mitigation and resiliency planning for major infrastructure, critical facilities, and other assets of regional significance. Specific examples to be addressed under this priority item include the following as recommended by the Advisory Committee:
    - Transportation infrastructure (e.g., Heroes Tunnel), water/wastewater facilities (e.g. water treatment plants, sewer pump stations, etc.), power utilities, and waterfront assets (e.g., marinas, boat ramps, and other water-dependent facilities located along the shoreline that are shared and used by people from across the region and contribute to the region's economic health).
    - Assets of regional significance include the Port of New Haven, Long Wharf (New Haven), Metro North and Amtrak lines, Tweed National Airport, and beaches of regional significance including Hammonasset Beach, West Haven/Savin Rock Beach, Lighthouse Point, and Silver Sands State Park.
- *Protect historic and cultural resources (with support from CT SHPO).* This priority was added to leverage existing efforts and resources being made available to the region in support of increasing the resilience of historic and cultural resources to natural hazards and climate change through the Connecticut Department of Economic and Community Development's (DECD) State Historic Preservation Office (CT SHPO). These efforts and resources include the identification of vulnerable historic resources and resiliency plans for municipalities across the state. Each of the coastal towns in the region (Milford, West Haven, New Haven, East Haven, Branford, Guilford, and Madison) have already received their own customized report under a SHPO grant, and a statewide report is anticipated soon. In making this a priority for the region, SCRCOG and the participating jurisdictions have agreed to focus on the following eight (8) categories of resilience strategies from the municipal reports in their current and future hazard mitigation planning efforts:
    - Identify Historic Resources
    - Revisit Historic Preservation Regulations and Ordinances
    - Coordinate Regionally and with the State
    - Revisit Floodplain Regulations and Ordinances
    - Incorporate Historic Preservation into Planning Documents
    - Strengthen Recovery Planning
    - Adaptation Measures
    - Educate
- *Help small businesses mitigate impacts of natural hazards (with support from CT DEEP).* This priority was added to include strategies for small businesses in natural hazard mitigation plans by leveraging technical assistance from the Connecticut Department of Energy and Environmental Protection (CT DEEP). In making this a priority for the region, SCRCOG and the participating jurisdictions have agreed to coordinate with CT DEEP to help small businesses mitigate the impacts of natural hazards, and more specifically, to improve chemical safety practices by small businesses throughout the region to prevent disruption of economic activity and protect the environment and public health during and following natural hazard events.

EVALUATING AND PRIORITIZING MITIGATION ACTIONS

C5. Does the Plan contain an action plan that describes how the actions identified will be prioritized (including cost benefit review), implemented, and administered by each jurisdiction **§201.6(c)(3)(iii) §201.6(c)(3)(iv)**

SCRCOG staff and Advisory Committee members considered a wide range of potential mitigation actions for the region as a whole and for individual jurisdictions to implement on their own. In order to further evaluate and narrow this range of potential actions down to a manageable number, SCRCOG staff and representatives from each of the 14 jurisdictions revisited the status of prior mitigation actions as identified and previously adopted in their respective mitigation plan, and also discussed the key findings and conclusions of the updated risk assessment (Chapter 4) and capability assessment (Chapter 5). Particular attention during this step was paid to the problem statements as identified or updated in the Risk Analysis section of the risk assessment, as well as the progress of implementation with regard to prior mitigation actions.

Next, in coordination with other local staff and municipal leaders, each jurisdiction relied on the criteria listed in **Table 6-219** to further evaluate and prioritize their proposed mitigation actions. These criteria helped to not only provide further qualitative screening for proposed mitigation actions to include in the plan update, but also aided in the specific ranking prioritization of specific mitigation actions included for SCRCOG and each jurisdiction.

Table 6-219 Evaluation and Prioritization Criteria

Priority Level	Evaluation and Prioritization Criteria
Very High	Extremely beneficial projects that will greatly contribute to mitigation of multiple hazards and the protection of people and property. These projects are also given a numeric ranking within the category.
High	Strategies that provide mitigation of several hazards and have a large benefit that warrants their cost and time to complete.
Medium	Strategies that would have some benefit to people and property and are somewhat cost effective at reducing damage to property and people.
Low	Strategies that would not have a significant benefit to property or people, address only one or two hazards, or would require funding and time resources that are impractical.

These priority levels were developed utilizing the following criteria:

- **Application to multiple hazards** – Strategies are given a higher priority if they assist in the mitigation of several natural hazards.
- **Time required for completion** – Projects that are faster to implement, either due to the nature of the permitting process or other regulatory procedures, or because of the time it takes to secure funding, are given higher priority.
- **Estimated benefit** – Strategies which would provide the highest degree of reduction in loss of property and life are given a higher priority. This estimate is based on the risk assessment chapter, particularly regarding how much of each hazard's impact would be mitigated.

- **Cost effectiveness** – To maximize the effect of mitigation efforts using limited funds, priority is given to low-cost strategies. Strategies that have identified potential funding streams, such as the Hazard Mitigation Grant Program, are also given higher priority.

Using the above evaluation and prioritization criteria, combined with local community knowledge, SCRCOG staff and the 14 jurisdictions classified each mitigation action to be included in their action plan as either Very High, High, Medium, or Low priority. Regardless of priority level assigned, the completion of many mitigation actions is contingent on the availability of funding. These priority classifications are specific to each jurisdiction and will be evaluated and updated as a matter of routine plan maintenance, and as local community conditions or planning objectives change over time.

COMPREHENSIVE RANGE OF MITIGATION ACTIONS

C4. Does the Plan identify and analyze a comprehensive range of specific mitigation actions and projects for each jurisdiction being considered to reduce the effects of each hazard, with emphasis on new and existing buildings and infrastructure. §201.6(c)(3)(ii)

The mitigation goals and objectives as established for this plan are fairly broad in scope. Mitigation actions on the other hand are more specific and identify a specific activity or process that is intended to reduce or eliminate risk to natural hazards in alignment with the goals and objectives. In general, mitigation actions can be categorized into four categories: Local Plans and Regulations, Structure and Infrastructure Projects, Natural Systems Protection, and Education and Awareness Programs. For this multi-jurisdiction plan, specific mitigation actions were identified by SCRCOG and each of the 14 participating jurisdictions and categorized under these four categories. **Table 6-220,** taken from FEMA's *Local Mitigation Planning Handbook*, clearly describes each of these mitigation types and provides examples.[405]

In addition, there are some actions related to risk management and emergency preparedness that aren't customarily considered "hazard mitigation" activities, but nevertheless are important to local communities and encouraged by FEMA through hazard risk reduction programs such as the Community Rating System (CRS). Examples include activities such as hazard warning systems, backup power generation and supply (e.g., generators), disaster preparedness and response operations (including evacuation, sheltering, etc.), and post-disaster recovery measures. While these types of actions were included in the original 2014 plan under the "Education and Awareness" category, they are now included under a fifth, separate non-mitigation category titled "Emergency Preparedness."

[405] FEMA Local Mitigation Planning Handbook, March 2013. p.6-4.

Table 6-220 Mitigation Action Types

Mitigation Type	Description	Examples
Local Plans and Regulations	These actions include government authorities, policies, or codes that influence the way land and buildings are developed and built.	• Comprehensive plans • Land use ordinances • Subdivision regulations • Development review • Building codes and enforcement • NFIP Community Rating System • Capital improvement programs • Open space preservation • Stormwater management regulations and master plans
Structure and Infrastructure Projects	These actions involve modifying existing structures and infrastructure to protect them from a hazard or remove them from a hazard area. This could apply to public or private structures as well as critical facilities and infrastructure. This type of action also involves projects to construct manmade structures to reduce the impact of hazards. Many of these types of actions are projects eligible for funding through the FEMA Hazard Mitigation Assistance program. *Task 9 – Create a Safe and Resilient Community* provides more information on these programs.	• Acquisitions and elevations of structures in flood prone areas • Utility undergrounding • Structural retrofits. • Floodwalls and retaining walls • Detention and retention structures • Culverts • Safe rooms
Natural Systems Protection	These are actions that minimize damage and losses and also preserve or restore the functions of natural systems.	• Sediment and erosion control • Stream corridor restoration • Forest management • Conservation easements • Wetland restoration and preservation
Education and Awareness Programs	These are actions to inform and educate citizens, elected officials, and property owners about hazards and potential ways to mitigate them. These actions may also include participation in national programs, such as *StormReady* or *Firewise* Communities. Although this type of mitigation reduces risk less directly than structural projects or regulation, it is an important foundation. A greater understanding and awareness of hazards and risk among local officials, stakeholders, and the public is more likely to lead to direct actions.	• Radio or television spots • Websites with maps and information • Real estate disclosure • Presentations to school groups or neighborhood organizations • Mailings to residents in hazard-prone areas • *StormReady* • *Firewise* Communities

To develop the mitigation actions in the following section, the consulting team briefed the Advisory Committee on the types of mitigation actions. Each of the actions was thoroughly explained and examples were given. Following the meeting, Advisory Committee members consulted with other representatives and experts in their jurisdiction to update their list of mitigation actions, including those prior actions to be carried forward in the plan update in addition to new actions that fall under these four categories. Additional and specific mitigation actions for consideration were identified through the public outreach and stakeholder engagement activities completed during the plan update process as described further in Chapter 3.

The mitigation actions included in this plan update are more focused on actionable, measurable projects or activities and do not include those actions that have become existing capabilities or ongoing activities (e.g., routine physical maintenance, standard operating procedures, or other regularly occurring actions). As a result, many of the mitigation actions included in previous plans were identified as such and no longer included (see "Progress on Local Mitigation Efforts").

REGIONAL ACTIONS

The South Central Regional Council of Governments is dedicated to regional cooperation enabling cities and towns to work together to accomplish projects they cannot do as efficiently or cost effectively by themselves; creating a sense of pride in the region by aspiring to the highest quality of life and economic well-being that can be achieved and greater accountability through voluntary cooperation in the region with productive results that benefit the entire region.

In support of this organizational mission, and in recognition that some mitigation actions are best accomplished through regional cooperation, the following regional mitigation actions have been incorporated into this plan update. These actions include those that may be implemented through multi-jurisdictional coordination between two or more municipalities and/or through increased coordination with SCRCOG. This includes some more specific activities in support of the Regional Mitigation Priorities established for this plan update as described earlier in this section (Table 6.4). This new section of the plan is intended to build upon and enhance the successful coordination and collaboration between jurisdictions across the region, and to accomplish risk reduction projects or activities that can be implemented more efficiently and effectively through such regional cooperation. Implementation of the below actions will generally be the responsibility of SCRCOG and municipal staff through 2023, with some external support and coordination as noted.

1. **Help Slow the Spread of the Emerald Ash Borer**
   Coordinate with CT DEEP and the Connecticut Agricultural Experiment Station to manage the Emerald Ash Borer (EAB). This specifically includes assisting with educational and outreach initiatives to slow the spread of the EAB and to take steps to minimize its impact. SCRCOG will support regional collaboration on such initiatives by disseminating information provided by CT DEEP to local municipalities or other regional partners. Municipalities will support CT DEEP's efforts to detect the signs and symptoms of EAB presence, and to increase public awareness of the ways in which individuals can help in these efforts. Municipalities will also routinely monitor ash trees within their jurisdiction and act quickly to report any trees that are declining and may pose a danger to people or structures. In these cases, a range of options will be considered before committing to the removal of ash trees or other trees due to this insect pest.

2. **Protect Critical Facilities and Assets of Regional Significance**
   SCRCOG and its member municipalities will coordinate efforts with other state and regional partners to increase the resilience of major infrastructure, critical facilities, and other assets of regional significance.

This specifically includes collaborating with asset owners and operators to mitigate their current and future vulnerabilities to natural hazards and climate change. For example, this includes supporting the Greater New Haven Water Pollution Control Authority (GNHWPCA) on the implementation of their proposed future hazard mitigation projects that include the relocation or retrofit of pump stations in flood hazard areas, the installation of emergency generators for critical facilities, and the protection of critical water/wastewater infrastructure in low lying areas from storm erosion and damage.

3. **Protect Historic and Cultural Resources**
   SCRCOG and its member municipalities will coordinate efforts with the Connecticut State Historic Preservation Office (CT SHPO) to increase the resilience of historic and cultural resources to natural hazards and climate change. These efforts will leverage and build upon the SHPO's ongoing initiatives to support the identification of vulnerable historic resources and preparation of resiliency plans for municipalities across the state. Specifically, this action will focus on implementing the following strategies across the region during the 2018-2023 planning cycle: (1) Identify Historic Resources; (2) Revisit Historic Preservation Regulations and Ordinances; and (3) Coordinate Regionally and with the State. For the coastal municipalities or others that have successfully implemented these strategies, additional strategies will be pursued in coordination with CT SHPO.

4. **Education and Awareness of Small Businesses**
   Coordinate with CT DEEP and local chambers of commerce to promote natural hazard risk awareness and risk reduction practices. This specifically includes but is not limited to implementing an educational program for small businesses with recommendations to eliminate/reduce toxic chemicals on-site when possible and/or use best management practices (BMPs) to prevent pollution from chemicals getting out into the environment. In coordination with CT DEEP, SCRCOG and participating jurisdictions will help disseminate information (as developed by DEEP) to increase the awareness of small businesses of any chemical/toxic products they use, store, and/or sell; and to use BMPs to decrease the risks associated with chemical releases into the environment during natural hazard events. For example, municipalities may provide such information on their website, through social media, with a brochure/poster, or workshop.

JURISDICTION SPECIFIC ACTIONS

Mitigation actions that are specific to SCRCOG and each jurisdiction were developed by Advisory Committee members who worked closely with other representatives from their jurisdiction. In completing this process, participating staff had the ability to refer to the status of prior mitigation actions that are to be carried forward in the plan update, as well as the problem statements in the Risk Analysis section of Chapter 4 (Risk Assessment) to help generate ideas. In addition, the problem statements provided continuity between the Risk Assessment and the Mitigation Strategy. Early in the plan update process, Advisory Committee members were provided and encouraged to use a digital (MS Excel-based) "Mitigation Action Tracker" spreadsheet in addition to Mitigation Action Worksheets (found in Appendix J) to develop or update their specific mitigation actions. Advisory Committee members then had ample time to prepare their updated or new actions and to review them with their municipal leaders and other stakeholders, the consulting team, and the Advisory Committee as a whole.

Mitigation actions for each participating jurisdiction are included in their own tabular mitigation action plan provided in this section. Each action has been identified with a unique mitigation action number (Action #), but these are not numbered in priority order as in the previous plan. Qualitative priority levels (Very High, High, Moderate, Low) have been assigned to each using the evaluation and prioritization criteria described earlier in this

chapter (Table 6.5). Also, please note that for those mitigation actions that are linked to an existing municipal Coastal Resilience Plan, the specific action from that plan is referenced in the Action Title (i.e., "CRP Action SB1").

Each jurisdiction-specific mitigation action plan is presented in tabular format with the following attribute information for each identified action:

- **Action #** – a unique identifier assigned to each action.
- **Action Title** – provides a brief summary of the proposed action.
- **Action Description** – describes the action in more detail, with some background on the issue or problem it will address.
- **Estimated Cost** – provides a general cost estimate, if applicable, or indicates other resources required for implementation (e.g., "staff time"). In cases where a dollar estimate is not available, the following qualitative descriptions are used: Very High = more than $1M; High = between $500k and $1M; Medium = between $100k and $500k; Low = less than $100k.
- **Potential Funding Source** – identifies potential funding sources, if applicable.
- **Lead Department** – Indicates the department/agency with primary responsibility to carry the action out.
- **Implementation Schedule** – Indicates the general schedule or anticipated date of completion.
- **Priority** – Classifies the action as a High, Moderate, or Low Priority based on the criteria established earlier in this chapter.

SCRCOG MITIGATION ACTIONS

South Central Region Council of Governments – Updated Mitigation Actions (2018-2023)							
Action #	**Action Title**	**Action Description**	**Estimated Cost**	**Potential Funding Source**	**Lead Department**	**Implementation Schedule**	**Priority**
1	Plan Maintenance	SCRCOG will maintain the current mitigation plan by seeking additional grant funding as needed.	$200,000	FEMA Mitigation Grant Programs	SCRCOG Staff	July 2018 – July 2023	Very High
2	Host and Facilitate Annual Mitigation Meetings	SCRCOG will continue to facilitate multi-jurisdiction collaboration through the hosting of annual mitigation meetings.	$1,000	SCRCOG	SCRCOG Staff	July 2018 – July 2023	High
3	Maintain Mitigation Website	SCRCOG will continue to maintain and update the Regional Hazard Mitigation webpages.	$2,000	SCRCOG	SCRCOG Staff	July 2018 – July 2023	High
4	Increase Plan Participation for Local Jurisdictions	SCRCOG will work to incorporate the Town of Meriden into the plan during the next plan update process.	$25,000	FEMA Mitigation Grant Programs	SCRCOG Staff	July 2022 – July 2023	Medium
5	Promote the CRS Program	SCRCOG will collaborate with its member municipalities to determine if there is interest in the CRS Program, and the type of technical assistance its member municipalities may require.	$50,000	FEMA Grant Programs; SCRCOG	SCRCOG Staff	March 2018 – March 2019	Medium
6	Mitigation Education and Awareness	SCRCOG will engage with its member municipalities to determine the necessary materials that may be needed for education opportunities. The materials may include mapping and presentations.	$10,000	SCRCOG	SCRCOG Staff	May 2018 – May 2021	Medium
7	Promote Awareness of Mitigation Grant Funding Opportunities	SCRCOG will continue to provide information to its members of mitigation grant opportunities. SCRCOG will explore opportunities for collaboration to pursue grant opportunities relevant to hazard mitigation.	$5,000	SCRCOG (subscription service)	SCRCOG Staff	July 2018 – July 2023	Medium

BETHANY MITIGATION ACTIONS

Town of Bethany – Updated Mitigation Actions (2018-2023)							
Action #	Action Title	Action Description	Estimated Cost	Potential Funding Source	Lead Department	Implementation Schedule	Priority
1	Hazard Tree Management	Continue the Town's aggressive tree removal program in coordination with local utility companies to identify and prioritize trees for the most urgent removal.	$100,000	Local (operating budget)	Tree Warden	Through 2023	High
2	Town Hall Generator	Install electric generator and quick-connect transfer switch to provide backup emergency power for Town Hall.	$50,000	Capital Improvement Plan Funding	Public Works	Scheduled for completion by 5/31/2018	High
3	Homebound and Elderly Resident Directory	Develop and maintain a Homebound and Elderly Resident Directory in order to quickly identify people with special needs during and following long-term power outages or other related emergency or disaster events. The Town will continue to collect data for both the senior and special needs population and will develop a method for Emergency Management to access data in time of emergency retaining confidentiality.	$25,000	Federal / State / Local	Human Services	Through 2023. Implementation of a secure electronic database is underway.	Medium
4	Community Shelter	As part of the ongoing project to replace the hanger at the old airport on Amity Road, ensure capabilities exist for the new structure to be used as a local community emergency shelter. This should include backup generator power and necessary facilities for overnight stays (kitchen and shower facilities).	$700,000	Local fundraising (in addition to grants already received).	Emergency Management Committee	Additional funding sources are being sought. Completion is funding-driven at this time.	Medium
5	Beaver Dams	Actions to address beaver dams on private land that are causing flooding on public land.	Estimates being sought	Town budget. Possible Conservation funding.	Highway for physical labor. Inland wetlands commission for oversight.	To be implemented with hiring of a consultant.	Medium
6	Miller Road Culvert Expansion	Increase capacity of Miller Road Culvert to eliminate future and repetitive damages and loss of service to	$40,000	CT DOT (if eligible for pilot program	Public Works	2020 due to funding	Low

Town of Bethany – Updated Mitigation Actions (2018-2023)							
Action #	**Action Title**	**Action Description**	**Estimated Cost**	**Potential Funding Source**	**Lead Department**	**Implementation Schedule**	**Priority**
		roadway and provide increased conveyance of stormwater during peak flows.		funding); HMGP in combination with PA 406 (post-disaster)		constraints and pending bonding	
7	Water Supply	Coordinate with the CT Water Planning Council on drought preparedness and response planning activities to ensure the Town's unique vulnerabilities to water shortages (dependency on wells for potable water, coupled with large equine population) are adequately addressed through State and local action. This includes the development of water storage tanks in multiple locations, especially in industrial areas (at minimum, the Town needs a 30,000-gallon tank).	$20,000	Federal / State / Local	Environmental Services	Through 2023 with no hard-set completion date.	Low
8	Grant Writer	Develop and hire a grant writer / resource development position for the Town.	Uncertain	Town Budget	Administration	FY 2018/2019	Low

BRANFORD MITIGATION ACTIONS

Town of Branford – Updated Mitigation Actions (2018-2023)							
Action #	**Action Title**	**Action Description**	**Estimated Cost**	**Potential Funding Source**	**Lead Department**	**Implementation Schedule**	**Priority**
1	Linden Avenue Erosion Protection Project	Identify and construct erosion protection measures along the coastal exposure of Linden Avenue.	$5,000,000	Federal/State/Local	Engineering Department	September 2014 – September 2020	Very high
2	Meadow Street and Indian Neck Ave Flood Protection Project	Flood gates for cattle crossing on Meadow Street. Will protect area from flooding and possibly improve access during flood events.	$800,000	State/Federal	Engineering Department	July 2018 – September 2023	High
3	Lanphier Cove Bank Stabilization (CRP Action DB1)	Stabilize Lanphier Cove eroding bank to protect sewer infrastructure.	$175,000	Federal/State/Local	Engineering Department	July 2018 – September 2023	High
4	Waverly Road Elevation (CRP Action SC3)	Continue pursuit of home elevation on Waverly Road.	$150,000 each structure	Federal/State/Local	Engineering Department	Annual Outreach Project	Medium
5	Property Acquisitions in Waverly Road/ Crouch Road Area (CRP Action SC4)	Pursue property acquisitions in Waverly Road and Crouch Road area.	$300,000 each structure	Federal/State/Local	Engineering Department	Annual Outreach Project	Medium
6	Fortify Branford Trolley Trail Bridge (CRP Action SC1)	Fortify Branford Trolley Trail Bridge abutments at Stony Creek.	$320,000	Federal/State/Local	Engineering Department	2018 – 2020	Medium

EAST HAVEN MITIGATION ACTIONS

Town of East Haven – Updated Mitigation Actions (2018-2023)							
Action #	Action Title	Action Description	Estimated Cost	Potential Funding Source	Lead Department	Implementation Schedule	Priority
1	East Haven Pump Station Resiliency Implementation Project	This project, to be led by the GNHWPCA, addresses flood resiliency at the following four (4) pump stations: Cosey Beach; Minor Road; Meadow Street; and Fairview Road. The proposed project, which has already been approved for HMGP funding, will modify the existing sanitary sewer infrastructure facilities to reduce or eliminate the long-term risk of flood damage to these pump stations.	High	FEMA HMA (HMGP)	E, FD, EM, PZ, in coordination with GNHWPCA	January 2019	Very High
2	Website Enhancement	Add pages to Town website dedicated to citizen education and preparation for natural hazard events.	Low	NA	EM	July 2018	Very High
3	ISTEA Grant for Stormwater Management	Develop an application of an Intermodal Surface Transportation Enhancement Act (ISTEA) grant for stormwater pollution mitigation; includes identification, retrofitting, and cleaning of catch basins.	Low	ISTEA	E, TA	May/June 2018	Very High
4	Join the CRS Program	Re-apply and join the FEMA Community Rating System (CRS) program at Class 8 or better.	Low	NA	EM	January 2019	Very High
5	Improvements to Coe Ave, Hemingway Rd, and Short Beach Rd	Investigate funding sources and feasibility of improvements to Coe Ave, Hemingway Rd, and Short Beach Rd intersection to mitigate flooding.	Low	Possible - HMA	DPW, CTDOT	June 2018	Very High
6	Elevate Vulnerable Town-Owned Roadways	Investigate funding sources and feasibility of elevating portions of Town-owned roads with an emphasis on those needed for inland evacuation.	Low	Possible - HMA	DPW	June 2018	Very High
7	Upgrade Stormwater Systems	Upgrade stormwater collection and discharge systems in downtown and coastal East Haven to keep up with rising sea level	Very High	Possible - HMA	DPW	June 2018	Very High
8	Contingency Plans for Winter Storms	Identify areas that are difficult to access during winter storm events and develop contingency plans.	Low	Possible - HMGP4	DPW	November 2019	Very High
9	Natural Hazards Awareness Week	Continue the Natural Hazards Awareness Week.	Low	NA	EM	July 2019	High

Town of East Haven – Updated Mitigation Actions (2018-2023)							
Action #	**Action Title**	**Action Description**	**Estimated Cost**	**Potential Funding Source**	**Lead Department**	**Implementation Schedule**	**Priority**
10	Update Flood Response Plan	Revise and update the East Haven Flood Response Plan. This would complement the EOP.	Low	NA	EM	January 2020	High
11	Pre-Event Sand Bag Stockpiling	Investigate locations and necessary labor involvement for the pre-event stockpiling of sand bags for use in the flood prone downtown areas.	Low	NA	EM	January 2020	High
12	Promote Storm Shutters for Coastal Areas	Promote the use of shutters for properties located along the coast to guard against window breakage which can result in structural failure.	Low	NA	EM, B	July 2019	High
13	Evacuation Plan for Laurel Woods	Develop a site-specific evacuation plan for Laurel Woods.	Low	NA	EM	July 2019	High
14	Update Zoning Regulations as Required for ICC	Make necessary changes to the Zoning Regulations so that all insured residents can be eligible for additional mitigation coverage through the NFIP's Increased Costs of Compliance (ICC).	Low	NA	PZ, EM	June 2019	High
15	Acquisition/Demolition of Flood Prone Properties	Pursue acquisition/demolition of flood prone properties for open space. RLPs should be prioritized.	High	Possible - HMA	EM, TC, TA	July 2019	High
16	Prioritize Potential Retrofit Projects for High Winds	Prioritize any wind-related retrofitting, given those buildings to be used as shelters the highest priority.	Low	Possible - HMA	EM, B	March 2019	High
17	Elevation of Flood Prone Properties	Pursue elevation of residential properties that suffer flood damage; RLPs should be prioritized as the Town has done in the past.	Medium	Possible - HMA	EM, B	Ongoing	High
18	Expand Local Stream Gauge Network	Identify funding sources and install staff gauges in smaller streams such as Tuttle Brook.	Low	Possible - CEDAP	EM	January 2020	High
19	Mutual Aid Agreements for Emergency Response	Pursue mutual aid agreements with organizations to provide labor during flooding to fill sand bags and assist with other response activities.	Low	NA	EM	January 2020	High
20	Annual Workshop on Natural Hazards	During the Natural Hazards Awareness Week, conduct an annual workshop regarding wind associated risks, retrofitting techniques, etc.	Low	NA	EM	December 2018	High
21	Backup Power for Town-Owned Buildings and Critical Facilities	Ensure that municipal departments and critical facilities have adequate backup power supply generation capabilities.	High	Possible - CEDAP, State5	EM	January 2020	High

Town of East Haven – Updated Mitigation Actions (2018-2023)							
Action #	**Action Title**	**Action Description**	**Estimated Cost**	**Potential Funding Source**	**Lead Department**	**Implementation Schedule**	**Priority**
22	Underground Utilities	Pursue funding to place utilities underground in existing developments.	Very High	Possible - HMA	TC, TA	January 2020	Medium
23	Improve Shelter Lighting	Improve lighting in shelters by wiring battery conditioners to generator circuits.	Low	NA	EM	January 2020	Medium
24	Satellite Shelter	Work with residents to develop a satellite shelter for residents that may become isolated during coastal flooding.	Low	Possible - CEDAP	EM	July 2019	Medium
25	Evacuation Protocol for Townsend Avenue Area	Work with residents and the City of New Haven to develop an evacuation protocol for East Haven residents near Townsend Avenue.	Low	NA	EM	July 2019	Medium
26	Newcomer's Club	Develop a Newcomer's Club so that new residents may receive flood preparedness information.	Low	NA	EM	July 2019	Medium
27	Automatic Sand Bagger	Investigate and pursue the purchase of an automated sand bagger by the town.	Low	Possible - CEDAP	EM	January 2020	Medium
28	Engineering Survey for Shelters	Request that the Town and the Board of Ed. conduct engineering surveys for shelters; recommend improvements if necessary.	Low	NA	EM, B	July 2019	Medium
29	NOAA Weather Radios	Work through the State to locate NOAA weather radios in commercial buildings with large population clusters.	Low	NA	EM	March 2019	Medium
30	Checklist for Land Development Applicants	Develop a checklist for land development applicants that cross references the specific regulations and codes related to disaster resilience.	Low	NA	PZ, B, E, FD	July 2018	Medium
31	Promote the Availability of Flood Insurance	Incorporate information on the availability of flood insurance into all hazard-related public education workshops.	Low	NA	EM, B	July 2020	Medium
32	Floodplain Open Space Acquisition	Pursue the acquisition of additional municipal open space in special flood hazard areas.	Very High	NA	TC, TA	Ongoing	Medium
33	Farm River Flood Mitigation	Continue to use modeling techniques to evaluate different flood mitigation options along the Farm River including floodplain storage, channel clearing, diversions, berms, dikes, bridge replacement, and culvert replacement as well as home elevations and acquisitions.	Low	Unlikely - HMA	EM, E	January 2020	Medium

Town of East Haven – Updated Mitigation Actions (2018-2023)							
Action #	**Action Title**	**Action Description**	**Estimated Cost**	**Potential Funding Source**	**Lead Department**	**Implementation Schedule**	**Priority**
34	Snow Removal Plan	Develop a plan to prioritize snow removal from the roof of municipal buildings (especially critical facilities) and have funding available for clearing.	Low	Possible - HMGP4	EM, B	July 2019	Medium
35	Flood Protection for Laurel Woods	Consider floodproofing measures for Laurel Woods Convalescent Home at 451 North High Street and/or elevate the structure.	High	Possible - HMA	EM	January 2020	Low
36	Limit Impermeable Surfaces in Flood Prone Areas	Review Subdivision Regulations and evaluate the possibility of incorporating changes to limit impermeable surfaces in flood prone areas.	Low	NA	PZ	March 2019	Low
37	Stream Maintenance Regulations	Explore the possibility of adopting a series of ordinances that would place the responsibility for stream maintenance on a property owner.	Low	NA	PZ, E	July 2020	Low
38	Workshop for Farm River Homeowners Association	Re-establish a relationship with the Farm River Homeowners Association and develop a workshop to educate residents in floodproofing.	Low	NA	EM	September 2018	Low
39	NFIP Education and Awareness for Builders, Developers, and Architects	Encourage builders, developers, and architects to become familiar with the NFIP land use and building standards by attending annual workshops.	Low	NA	EM, B	March 2019	Low
40	Increase Awareness of Town Plowing Routes	Consider posting the plowing routes in municipal buildings and the town website so residents and business owners may better understand risks.	Low	NA	DPW	November 2018	Low
41	Floodproof the Public Works Facility	Pursue floodproofing for the Public Works Facility.	High	Possible - HMA	DPW	January 2020	Low
42	Floodproof the Police Department Headquarters	Pursue floodproofing for Police Department Headquarters.	High	Possible - HMA	PD	January 2020	Low

GUILFORD MITIGATION ACTIONS

Town of Guilford – Updated Mitigation Actions (2018-2023)							
Action #	Action Title	Action Description	Estimated Cost	Potential Funding Source	Lead Department	Implementation Schedule	Priority
1	Evacuation Signs	Acquire and install evacuation signs.	Low	PHEP Grant	BOS, DPW	2018	High
2	Expand Reverse 911 Coverage	Encourage the public to register their mobile phones with the reverse 911 system.	Low	PHED Grant	BOS, EMA	2018	High
3	Underground Utilities	Require that utilities be placed underground in new developments.	Low	NA	PZC	2018	High
4	Revetment Repair for Marina Area	Repair stone revetment in the marina area to protect adjacent road and sidewalk.	Medium	Unlikely - HMA	HMC, MC	2019	High
5	Increase Funding for Tree Warden	Increase funding for the Tree Warden to address a wider range of tree limb hazards than the current budget allows.	Medium	Town Budget	TW, BOS	2019	High
6	Extend Public Water Supply	Extend public water supply and fire protection to Mulberry Point, Tuttles Point, and Indian Cove.	Very High	Possible - DWSRF, AFGP, HMA	BOS	2018	High
7	Public Outreach and Education for Natural Hazards	Disseminate informational pamphlets regarding natural hazards to public and add pages to the Town website dedicated to citizen education and preparation for natural hazard events. These efforts will be aimed at promoting increased awareness and education on what businesses and property owners can do to prepare and prevent property damage and reduce injury and loss of life.	Low	Town	HMC, Engineering	2019	High
8	Coordinate with DOT on Flood Mitigation	Work with CT DOT to mitigate flooding problems along Route 146 at West River (upgrade bridge), Long Cove, Great Harbor/Hidden Lake (upgrade culverts) and along Leetes property.	Very High	State	Engineering	2018	High
9	Upgrade Community Center	Upgrade the Community Center to improve its viability as one of two primary shelters. Contract Engineer to inspect building and create recommendations regarding structural integrity for different storm events.	High	Possible - HMA, CEDAP, EOC	BOS, EMA, DPR	2020	Medium
10	CRS Participation	Consider enrolling in the Community Rating System.	Low	NFIP (insurance benefits only)	BOS, Engineering	2018	Medium

Town of Guilford – Updated Mitigation Actions (2018-2023)							
Action #	**Action Title**	**Action Description**	**Estimated Cost**	**Potential Funding Source**	**Lead Department**	**Implementation Schedule**	**Priority**
11	Improve Egress for Indian Cove	Create design plans to elevate Daniel Avenue or West Lane to provide multiple modes of egress for Indian Cove residents.	High	Possible - HMA	DPW	2021	Medium
12	Elevate Low Spots on Chimney Corner Road	Create design plans to elevate low spots on Chimney Corner Road.	High	Unlikely - HMA	DPW	2023	Medium
13	Erosion Control Study	Conduct study of erosion control alternatives at Jacobs Bch, Chittenden Bch, Grass Is., and Chaffinch Is; create conceptual designs; implement feasible/prudent alternatives.	High	Unlikely - HMA	HMC, DPW	2019	Medium
14	Construct Walkways for Areas of Erosion Concern	Construct pile-supported walkways where foot traffic is exacerbating erosion.	High	Unlikely - HMA	HMC, DPW, B&E, DPR	2021	Medium
15	Municipal Roof Load Study	Conduct a study to identify municipal buildings, critical facilities, and others that are vulnerable to roof damage or collapse due to heavy snow.	Medium	Possible – HMGP; Capital Budget	DPW, B&E, BOE	2019	Medium
16	Incorporate Dam Failure Areas into Reverse 911 System	Include dam failure areas in the Reverse 911 emergency contact database.	Low	NA	EMA	2018	Medium
17	Inspections for Town-owned Dams	Conduct formal inspections of Town-owned dams, especially Lake Quonnipaug Dam.	Low	NA	Engineering	2019	Medium
18	Living Shoreline for Chittenden Beach	Chittenden Beach living shoreline – Develop permit-level plans with required studies to obtain permits from CT DEEP and USACE.	Medium	Grants	Natural Resources, Harbor Management	2020	Medium
19	Relocate Public Works Facility	Relocate the Public Works Facility outside a flood zone and hurricane surge zone.	Very High	Possible - HMA, EOC	BOS, DPW	2023	Low
20	Mutual Aid for Brown's Boat Yard	Develop mutual aid agreement with Brown's Boat Yard to enable its assistance prior to disasters. Town to assist boat yard in locating upland storage area.	Low	NA	BOS, HMC	2023	Low
21	Mutual Aid for Guilford Boat Yard	Develop mutual aid agreement with Guilford Boat Yard to enable its assistance prior to disasters. Town to assist boat yard in locating upland storage area.	Low	NA	BOS, HMC	2023	Low
22	H&H Modeling for West River Watershed	Develop hydrologic and hydraulic model of the West River watershed as a way to prioritize mitigation	Medium	NA	B&E, DPW	2023	Low

Town of Guilford – Updated Mitigation Actions (2018-2023)							
Action #	**Action Title**	**Action Description**	**Estimated Cost**	**Potential Funding Source**	**Lead Department**	**Implementation Schedule**	**Priority**
		activities such as culvert and bridge upgrades, property acquisitions and elevations, and retention/detention.					
23	Infrastructure Upgrades along West River	Upgrade bridges and culverts along West River south of Lake Quonnipaug.	High	Unlikely - HMA	DPW	2023	Low
24	Drainage Improvements for Munger Brook	Improve drainage and Munger Brook flood conveyance in the area that floods between County Road and Route 80.	Medium	Possible - HMA	DPW	2023	Low
25	Elevation of Whitfield Street	Create design plans to elevate Whitfield Street from Seaview Terrace to the entrance of the marina to minimize flooding and improve drainage.	High	Possible - HMA	DPW	2023	Low
26	Elevate Low Spots on Seaside Avenue	Create design plans to elevate selected locations along Seaside Avenue.	High	Unlikely - HMA	DPW	2023	Low
27	Accommodate Migration of Tidal Wetlands	Set aside sufficient land for landward migration of tidal wetlands.	Very High	Bonds	BOS	2018	Low
28	Assistance and Outreach to Dam Owners	Provide technical assistance and outreach to owners of private Class B and Class C dams regarding inspections and maintenance.	Low	NA	Engineering	2019	Low
29	Evaluate Unclassified Dams	Evaluate and classify the seven unranked dams in Guilford.	Low	NA	Engineering	2019	Low
30	Public Outreach for Wildfire Hazards	Continue to support public outreach programs to increase awareness of forest fire danger, equipment usage, and protecting homes from wildfires.	Low	NA	FD	2018	Low
31	Phragmites Control	Develop a program of phragmites control that minimizes fires (work with CT DEEP on Phragmites Control Projects).	Medium	NA	FD, Natural Resources	2020	Low

Lead Departments: BOE = Board of Education; BOS = Board of Selectmen; B&E = Buildings and Engineering Department; DPR = Department of Parks and Recreation; DPW = Department of Public Works; EMA = Emergency Management Agency; FD = Fire Department; HMC = Hazard Mitigation Commission; PZC = Planning and Zoning Commission; TW = Tree Warden.

HAMDEN MITIGATION ACTIONS

Town of Hamden – Updated Mitigation Actions (2018-2023)							
Action #	**Action Title**	**Action Description**	**Estimated Cost**	**Potential Funding Source**	**Lead Department**	**Implementation Schedule**	**Priority**
1	FEMA Flood Study Update - Part II	Update FEMA flood study for Hamden using LIDAR technology.	$55,000	FEMA	FEMA	September 2020	High
2	Skiff Street Bridge Replacement	Replace Skiff Street bridge with a wider one that will reduce upstream flooding.	$8,300,000	Fed/Local	Hamden Engineering	September 2017 – September 2019	High
3	Promote Nature-Based Solutions for Hazard Mitigation	Promote the conservation and stewardship of green infrastructure within the Town, including a vibrant tree canopy, to reduce flooding and minimize the urban heat island effect. This includes identifying and supporting increased tree planting and proper tree maintenance.	N/A (staff time and in-kind contributions from HTA)	N/A	Tree Commission, in coordination with Hamden Tree Alliance	Through 2023	High
4	Tree Pruning	Tree pruning adjacent to power distribution wires.	$50,000	United Illuminating and its contractors	United Illuminating	September 2019	Medium
5	Snow Load Study	Study town buildings to determine snow removal criteria.	$30,000	Local Capital Budget	Town of Hamden	June 2021	Medium
6	Raise Paradise Avenue South of Howard Drive	Raise Paradise Avenue south of Howard Drive.	$500,000 - 1,000,000	Local Capital Budget	Town of Hamden	September 2021	Medium
7	Replace Mill River Pump Station	Replace Mill River Pump Station	$15,000,000	Local Capital Budget	Hamden Engineering	September 2022	Medium
8	Educational Outreach on Tree Preservation	Develop and conduct an outreach campaign to increase the education and awareness of citizens on what they can do to help preserve, maintain, and protect healthy trees throughout Hamden.	$10,000	Local Capital Budget	Tree Commission, in coordination with Hamden Tree Alliance	Through 2023	Medium
9	Integrate Hazard Mitigation with Tree Preservation Planning	Develop an action plan to significantly increase tree planting, caring for these newly planted trees (including watering when necessary), and protecting our existing healthy trees. Emphasize the essential services that trees provide, which includes natural hazard risk reduction.	$5,000	Local Capital Budget	Tree Commission, in coordination with Hamden Tree Alliance	Through 2023	Medium

MADISON MITIGATION ACTIONS

Town of Madison – Updated Mitigation Actions (2018-2023)							
Action #	Action Title	Action Description	Estimated Cost	Potential Funding Source	Lead Department	Implementation Schedule	Priority
1	Radio Infrastructure Improvements	New dispatch consoles; microwave connectivity between towers; simulcast to allow communication for both towers simultaneously; new tower.	$1,500,000	General Municipal Funds	Police Department	Expected Completion in October 2017	Very High #1
2	Adopt A 1-Foot Freeboard Requirement in the Floodplain Management Ordinance (CRP Action TR3)	Adopt the FEMA suggested 1-foot freeboard requirement in the next update of the Floodplain Management Ordinance.	N/A	N/A (absorbed into existing departmental funding)	Floodplain Administrator / Town Engineer	0 - 1 year	Very High #2
3	Expand the Definition of 'Substantial Improvement' in the Floodplain Management Ordinance to Include Improvements Made Over Five Years (CRP Action TR4)	Adopt a five-year 'look back period' to further efforts to bring non-complying structures into compliance with the FEMA construction standards.	N/A	N/A (absorbed into existing departmental funding)	Floodplain Administrator / Town Engineer	0 - 1 year	Very High #3
4	Generator Installation at Town and School Facilities	Install new generators at critical municipal facilities.	Varied based on location	FEMA Hazard Mitigation Assistance Funding	Emergency Management	0 - 5 years	Very High #4
5	Utilize Municipal GIS Program in Hazard Mitigation Planning Efforts	Utilize GIS to map areas that are at risk of flooding, identify local evacuation routes, etc.	$2,500	Municipal Funding Sources	Emergency Management	0 - 2 years	Very High #5
6	Middle Beach Road Revetment (CRP Action MBR1)	Rehabilitation of an approximate 750-foot-long stone revetment along Middle Beach Road.	$600,000	FEMA Hazard Mitigation Grant Program	Public Works and Engineering	5 - 10 years	High

Town of Madison – Updated Mitigation Actions (2018-2023)							
Action #	**Action Title**	**Action Description**	**Estimated Cost**	**Potential Funding Source**	**Lead Department**	**Implementation Schedule**	**Priority**
7	Garvin Point Bulkhead (CRP Action SC2)	Rehabilitation of an approximate 280-foot-long steel sheet pile bulkhead at Garvin Point.	$400,000	FEMA Hazard Mitigation Grant Program	Public Works and Engineering	0 - 5 years	High
8	East River Flood Mitigation	Installation of a flood control structure adjacent to the East River.	$500,000	Emergency Watershed Program/USDA Natural Resources Conservation Service	Public Works and Engineering	5 - 10 years	High
9	Surf Club Dune Restoration (CRP Action SC2)	Restoration of coastal dune at Surf Club Recreation Facility.	$200,000	FEMA Hazard Mitigation Grant Program	Public Works and Engineering	0 - 5 years	High
10	Review Suitability of Town Facilities for Alternate Shelter Locations	Evaluate the suitability of other municipal facilities to serve as shelters during storm events.	N/A	N/A (absorbed into existing departmental funding)	Emergency Management	0 -2 years	High
11	Update Stormwater Management Regulations	Adopt new stormwater management regulations and Low Impact Development (LID) standards into the Town of Madison Planning & Zoning Regulations to help address issues stemming from routine rain events.	N/A	N/A (absorbed into existing departmental funding)	Engineering and Land Use	0 -1 years	High
12	Incorporate a stand-alone hazard mitigation section in the Plan of Conservation and Development (POCD)	Highlight hazard mitigation actions more prominently in the next update of the Plan of Conservation and Development (POCD).	N/A	N/A (absorbed into existing departmental funding)	Land Use	Coordinated with required 2023 update	Medium
13	Circle Beach Road Maintenance Standards (CRP Action CB1)	Determine appropriate road maintenance standards for Circle Beach Road in recognition of repetitive damage due to flooding and storm surge.	N/A	N/A (absorbed into existing departmental funding)	Emergency Management	0 -2 years	Medium
14	Implement public outreach efforts to ensure residents are	Employ various communication measures (website, email, etc.) to help residents be prepared for natural hazard event.	N/A	N/A (absorbed into existing	Emergency Management	0 -2 years	Medium

Town of Madison – Updated Mitigation Actions (2018-2023)							
Action #	**Action Title**	**Action Description**	**Estimated Cost**	**Potential Funding Source**	**Lead Department**	**Implementation Schedule**	**Priority**
	adequately prepared for natural hazard events			departmental funding)			
15	Identify Hazard Mitigation Structure and Infrastructure Projects in the Five-Year Capital Plan	Ensure that proposed hazard mitigation projects are included in the five-year capital plan.	N/A	N/A (absorbed into existing departmental funding)	Public Works and Engineering / Finance Department	Completed by July 1, 2018	Medium
16	Form a Hazard Mitigation Plan Steering Committee and Report Annually to the Board of Selectmen.	Convene a Hazard Mitigation Plan Steering Committee to periodically review hazard mitigation priorities and actions.	N/A	N/A (absorbed into existing departmental funding)	Office of the First Selectman	Upon plan adoption	Medium
17	Increase Town Wide Tree & Limb Maintenance Budget to Limit Road Blockage and Power Outages During Storms (CRP Action PP2)	Increase funding for municipal tree and limb maintenance.	$15,000 - $25,000	Municipal Funding Sources	Public Works and Engineering / Finance Department	Completed by July 1, 2018	Medium
18	Update Emergency Operations Plan Annually	Perform annual updates of the Local Emergency Operations Plan.	N/A	N/A (absorbed into existing departmental funding)	Emergency Management	Annually	Medium
19	Plan for Extended Outages	Plan for extended periods of outages as part of routine emergency preparedness planning and incorporate efforts to be more self-reliant during such events.	N/A	N/A (absorbed into existing departmental funding)	Emergency Management	Annually	Medium
20	Compile first floor elevation data for houses in the flood zone	Through a combination of research and field work, compile first floor elevation data for all homes within the flood zone.	N/A	N/A (absorbed into existing departmental funding)	Building Department	0 - 2 years	Low

MILFORD MITIGATION ACTIONS

City of Milford – Updated Mitigation Actions (2018-2023)							
Action #	Action Title	Action Description	Estimated Cost	Potential Funding Source	Lead Department	Implementation Schedule	Priority
1	300 KW Fuel Cell-Housatonic WWTP	Provide continuing heat and power supply to sewage treatment plant.	$4,000,000	Grant funding	Wastewater	2 years: December 2020	High
2	Annual Survey and Monitoring for Woodmont Beach (required by ACOE)	Woodmont Beach study and investigate erosion control, repair/replacement of shoreline storm drains and sand replenishment. This amount will be used to fund the study only.	$10,000	Grant funding	DPW	Annual	High
3	Wepawaug River Pond Dredging/Dam and Shore Rehabilitation	Dredge Wepawaug River Ponds (North St. (upper) Duck Pond, City Hall (lower) Duck Pond, and Prospect Street Pond). Repair dams and shore walls. The ponds have been filled with silt and debris which threatens wildlife and habitats. Lack of sediment storage behind dams is causing siltation of the harbor requiring frequent dredging. Dredging, dam and shore repair has not been done in several decades.	$2,100,000	Bonds	DPW	4-5 years: November 2107 - November 2018	High
4	Gulf Beach	Gulf Beach maintenance and sand replenishment as needed.	$40,000	Grant funding	DPW	Annual (seasonal)	High
5	Milford Harbor	Dredging of Milford's Inner Harbor, Federal Channel, and Federal Anchorage.	$3,850,000	Federal funds and TBD	ACOE & Harbor Commission	5 years: December 2020	High
6	Walnut /Wildemere Beach (CRP Action WW3)	Coastal resiliency plan and permitting project for sand replenishment and outfall replacement /repair.	$525,000	CDBG-DR State and Federal funds	DPW	3-5 years: November 2016 - September 2019	High
7	Gulf Street & Welchs Point Road Bluff Stabilization	The natural earth bluff was eroded by Storm Sandy. If it continues to erode, it will expose the underground utilities and endanger the asphalt road. Planning and permitting project only.	$275,000	CDBG-DR State and Federal funds	DPW	3-5 years: November 2016 - November 2018	High
8	Bayview Beach Area Flooding Study and Drainage	Bayview Beach Area Flooding Study and Drainage Improvements in the area of Field Court. The proposed planning, permitting, and construction	$1,726,150	CDBG-DR State and Federal funds	DPW	3-5 years: October 2016 - June 2019	High

City of Milford – Updated Mitigation Actions (2018-2023)							
Action #	**Action Title**	**Action Description**	**Estimated Cost**	**Potential Funding Source**	**Lead Department**	**Implementation Schedule**	**Priority**
	Improvements (CRP Action BB2)	project will mitigate flooding dangers in the area and provide safer access through the streets.					
9	Beachland Avenue Road Elevation (CRP Action MC3)	Elevate the lower portion of Beachland Avenue to mitigate flooding.	$638,250	CDBG-DR State and Federal funds	DPW	3-5 years: November 2016 - November 2018	High
10	Crescent Beach Resiliency (CRP Action BW2 and BW3)	Analysis of resiliency options for the Woodmont Crescent Beach. The proposed project is a three-part project that will include a survey and analysis of Crescent Beach and the surrounding area, a planning stage, and a final design stage. Grant # 6206, Expiration 2/28/2019.	$225,000	CDBG-DR State and Federal funds	DPW	1-2 years: June 2019	High
11	Pelham Street (Bay Street-paper street) Public Access Resiliency (CRP Action MC6 and MC7)	Analysis of resiliency options to stabilize bluff and protect public access at the base of the Bay Street (paper street). Planning and permitting project only.	$150,000	CDBG-DR State and Federal funds	DPW	1-2 years: June 2019	High
12	Eisenhower Park Pond - Wepawaug River Dredging/Dam Spillway Rehabilitation	Dredge Wepawaug River Pond at Eisenhower Park. Repair dams and shore walls. The pond has been filled with silt and debris which threatens wildlife and habitats. Dredging, dam and spillway repair has not been done in several decades.	$1,545,000	Grant funding	DPW	3-5 years: November 2021 - November 2023	High
13	Gulf Beach Breakwater (CRP Action GB-1)	Design Plan, Permitting and construction of a stone breakwater to protect Gulf Beach from sand erosion and sediment accumulation in Milford Harbor.	$503,500	CDBG-DR State and Federal funds	DPW	5 years: September 2014 - September 2019	High
14	Morningside Bluff, Seawall and Revetment (CRP Action MH1 and MH2)	Repair of Morningside revetment to protect Morningside Drive and infrastructure. Construction of a seawall to stabilize the eroding bluff.	$1,180,480	CDBG-DR State and Federal funds	DPW	5 years: September 2014 - September 2019	High
15	Beaver Brook WWTP Flood Control Project (CRP Action SS1)	WWTP processes 25% of the City's Sewage and portions of the facility are located in the zone AE (10). Proposal to protect the infrastructure and functioning of the plant.	$2,000,000	Federal Funds & TBD	DPW	3-4 years: December 2021 - December 2022	High

City of Milford – Updated Mitigation Actions (2018-2023)							
Action #	**Action Title**	**Action Description**	**Estimated Cost**	**Potential Funding Source**	**Lead Department**	**Implementation Schedule**	**Priority**
16	Pump Station Flood Mitigation	Milford has 40 pump stations for its sanitary sewer system. Pump stations to be reviewed to enhance equipment for improving resiliency. Planning and permitting project only.	$200,000	Grant funding	Wastewater	3-5 years: November 2021 - November 2023	High
17	Microgrid Project	To provide power resilience to Parsons Government Center, City Hall, Harborside Middle School, Federal Senior Housing, and Milford Senior Center facilities in the event of a power loss.	$4,500,000	CT DEEP Grant	DPW	2 years: October 2017 - October 2019	High
18	Milford Point Road Elevation Project (CRP Action MP-1)	The road elevation project will mitigate street flooding occurring during lunar tides and provide a pedestrian sidewalk and boardwalk section.	$501,537	CDBG-DR State and Federal funds	DPW	4 years: 2018 – 2022	High
19	CIRCA Walnut Beach Dune Restoration Project (CRP Action WW6)	This project is managing invasive vegetation in the Walnut Beach Dune and restoring native dune plantings. This will enhance dune resilience, improve habitat and enhance aesthetics.	$7,830	CIRCA Grant (UConn and DEEP)	Open Space & Natural Resource Agent	2 years: January 2017 - June 2018	High
20	NRCS Emergency Floodplain and Watershed Protection Program (EWP/FPE) (CRP Action PA1)	Conservation easement on 4 parcels of Milford Land Conservation Trust Land (approximately 10 acres) located in upper Calf Pen Meadow Marsh.	$105,000	NRCS EWP/FPE Grant	NRCS	2019	High
21	Elevation of Sailors Lane Pump Station	Project to elevate the generator and equipment on Sailors Lane.	$200,000	CDBG	DPW	2015 - April 2018	High
22	Debris Management Site Acquisition	Proposed 10-acre industrial land adjacent to the City's Transfer site on Oronoque Road is being considered for purchase for disaster debris management.	$1,300,000	Grant funding	DPW	2018	High
23	Eisenhower Park Environmental/Existing Renovations	Environmental reclamation, natural resource & recreational improvement, floodplain and water quality improvement, park maintenance and park security.	$380,000	Grant funding	Recreation	5 years: September 2023	Medium
24	Flax Mill Lane Bridge Repair	Rehabilitation and repairs to the deck, piers and abutments to the Flax Mill Lane Bridge over the Wepawaug River. The bridge was constructed in	$2,500,000	State	DPW - Engineering	1-2 years: August 2019	Medium

City of Milford – Updated Mitigation Actions (2018-2023)							
Action #	**Action Title**	**Action Description**	**Estimated Cost**	**Potential Funding Source**	**Lead Department**	**Implementation Schedule**	**Priority**
		1935 and has been identified as requiring work to maintain its structural integrity and aesthetic charm.					
25	Tumblebrook Flood Control Study	Commission study to control flooding along Tumblebrook which flows approximately 3,000 linear feet from the Orange town line to Route 1 (Boston Post Road). Watershed encompasses over 500 acres of densely developed and populated area. Flooding occurs in heavy rains affecting many homes and flooding on Route 1.	$30,000	Grant funding	DPW	4-5 years: November 2019 - November 2023	Medium
26	City-Wide Flood Zone Warning System Upgrade	Flood gauge and flood warning system upgrades town wide.	$125,000	Grant funding	Emergency management	3-5 years: November 2021 - November 2024	Medium
27	IT Infrastructure	Where appropriate and when available the City needs to upgrade IT, mapping and communications infrastructure. This will give capabilities to mitigate and assess hazard risks and perform public outreach.	$100,000	Grant funding	MIS	5 years: August 2023	Medium
28	Coastal Resiliency for Areas Outside Existing Resiliency Projects	Milford has approximately 17 miles of coastline. Many low-lying shoreline neighborhoods are prone to flooding and shoreline erosion. Some have benefited from resiliency projects. Others are undergoing study. This project would review the remaining areas.	500,000	Grant funding	DPW	2-4 years: August 2020 - August 2022	Medium

NEW HAVEN MITIGATION ACTIONS

City of New Haven – Updated Mitigation Actions (2018-2023)							
Action #	Action Title	Action Description	Estimated Cost	Potential Funding Source	Lead Department	Implementation Schedule	Priority
1	Long Wharf Flood Protection	Implement flood protection recommendations from Long Wharf Flood Protection study including living shoreline, deployable flood dams at I-95 underpasses, and planning and design of permanent flood wall.	>$5,000,000	FEMA, USACE, and others	Board of Alders with City Plan	7/2019-6/2021	Very High
2	Downtown Green Infrastructure	Installation of green infrastructure within the downtown drainage area to alleviate pressure on the storm sewer system. Roughly 200 locations have been identified throughout the Downtown drainage area. This is considered Phase 2 of the Tranche 2 funding. Phase I is the implementation of the proposed alternative recommended in the Downtown Stormwater Modeling study. Of the $4 million received in Tranche 2 funding, roughly $2.5 million will be used for installation of green infrastructure and the remaining for the implementation of the stormwater modeling study's recommended alternative.	$2,500,000	CDBG - DR (Tranche 2)	Engineering Department	8/2016- 6/2019	Very High
3	Quinnipiac River riprap repairs	Repair of existing riprap and seawall.	$300,000	Capital improvement	Parks Department	7/2018-6/2019	Very High
4	Lighthouse Point Park Carousel Building Floodproofing.	Floodproof existing Carousel Building to higher elevation in park to eliminate any future flooding of building.	$1- $2 million	FEMA, CDBG-DR, others	Parks Department	TBD	Very High
5	City Point Flood Mitigation Measures Implementation.	Implement recommendations of City Point flood mitigation study.	>$5,000,000	TBD	TBD	TBD	Very High
6	CSO Clean Water Fund projects	Several projects proposed: 1. Installation of approximately 75 bioswales for CSO reduction within the West River Watershed 2. CSO Closure and Regulator Improvements at Quinnipiac/Clifton Street, George/Temple Street, and Mitchell Drive	$145,200,000 (total)	Multiple: CWF/Blended Grant Loans/ Sewer Lining Loans (see note above under	GNHWPCA	All projects to be completed by 2022	Very High

City of New Haven – Updated Mitigation Actions (2018-2023)							
Action #	**Action Title**	**Action Description**	**Estimated Cost**	**Potential Funding Source**	**Lead Department**	**Implementation Schedule**	**Priority**
		3. Union Street and East Street Pump Station Upgrades 4. Yale Campus Trumbull Street Area Sewer Separation Phase 2A 5. West River CSO Improvements at Orange Street, Ella T. Grasso Boulevard, and Whalley Avenue 6. Union Street Downtown Crossing CSO Improvements 2018		estimated costs).			
7	Mill River	Implement recommendations of the Mill River planning study that forecast storm surge and sea level rise within the Mill River Industrial District and then to assess three coastal zone management approaches: natural attenuation, intensive infrastructure investment and a balance of new infrastructure with attenuation.	>$5,000,000	FEMA, USACE, and others	Board of Alders with Engineering, Public Works, City Plan, and Economic Development	7/2019-6/2021	Very High
8	Dam failure drill with Regional Water Authority	Work with Regional Water Authority to complete a drill of potential failures of the West River, Whitney, and Maltby Dams which are all located upstream of the City.	Less than $5,000 per year	Operating budget	Emergency Management	8/2017-7/2018 for first year, then annually	Very High
9	Implementation of CRS Program for Public Information	The City Plan Department must ensure that the City makes progress in the many action items in the PPI. Emergency Management will coordinate and lead Public Information Meetings at public libraries within Quinnipiac, East Shore and City Point neighborhoods to review the CRS rating system, the city's flood mitigation strategies, and flood preparedness.	Less than $5,000 per year	Operating budget	City Plan and Emergency Management	7/2016-6/2017 for first year, then annually	Very High
10	Beach Nourishment South of Pardee Seawall	Beach nourishment in front of private homes on Townsend Avenue for flood prevention.	$1,800,000	CDBG-DR	Engineering Department	10/2017-5/2019	High
11	River Street Bulkhead	Shoreline stabilization along city property to prevent further erosion along the Quinnipiac River including sections of steel bulkhead and revetments with public access.	Analysis and design budget is $342,000;	CDBG-DR for analysis and design/TBD for construction	Economic Development Administration	TBD	High

City of New Haven – Updated Mitigation Actions (2018-2023)							
Action #	**Action Title**	**Action Description**	**Estimated Cost**	**Potential Funding Source**	**Lead Department**	**Implementation Schedule**	**Priority**
			Construction budget is $3 million (preliminary)				
12	Downtown Stormwater Modeling and Drainage System Improvements Project	Hydraulic study of the Downtown area including Union Avenue and the Route 34 underpasses. The result of this study will inform the sewer system improvements will be implemented. The recommended alternative will be designed to construction-level documents using a portion of a CDBG-DR Tranche 2 grant (roughly $1.5 million).	$350,000 for study $1.5 million for design is underway	CDBG-DR (Tranche 1 & 2)	Engineering Department	Study completed March 2017. Design to be completed June 2019	High
13	Church Street South Residential Planning and Demand Analysis	During Hurricane and other storm surges, excessive flooding occurs along Church Street South making it an extremely vulnerable community for residents and visitors. The scope of the Residential Planning and Demand analysis will determine the most sustainable residential and mixed-use structure(s) to be developed based on the area's need and will leverage existing planning initiatives included in the storm water and flood mitigation studies as well as the Community Plan to determine a viable mix of housing and commercial developments for the redeveloped property.	$500,000	CDBG-DR	Livable Cities Initiative	Uncertain (still TBD)	High
14	Morris Cove Drainage Improvement Project	Redirection of existing drainage to improve conveyance of stormwater flow.	$400,000	Capital improvement	Engineering Department	7/2018-6/2019	High
15	Fort Hale Park drainage outlet rehabilitation	Restoration and silt removal from an existing drainage channel. Requires access to the Armed Forces Reserve Center but would solve a drainage problem for residents near the USCG facility.	In kind from DEEP to dredge outlets as part of mosquito control.	Capital improvement	Parks Department	7/2018-6/2019	High
16	East Shore Park shoreline stabilization	Living Shoreline solutions are being studied, including: segmented sills with marsh fringe, regrading and vegetating waterfront slopes with	Approximately $500,000.	CIRCA; City operating budget	Parks Department	7/2018-6/2019	High

City of New Haven – Updated Mitigation Actions (2018-2023)							
Action #	**Action Title**	**Action Description**	**Estimated Cost**	**Potential Funding Source**	**Lead Department**	**Implementation Schedule**	**Priority**
		armored toe, and improving public access to the waterfront.					
17	Criscuolo Park seawall	Install wall along shoreline of park to prevent flooding of park.	$750,000	Capital improvement	Parks Department	7/2018-6/2019	High
18	Lighthouse Point Park Carousel Building Floodproofing Study.	Conduct feasibility study to floodproof Carousel building to higher elevation in park to eliminate any future flooding of building.	$50,000	Operating budget	Parks Department	TBD	High
19	Fort Hale Park shoreline stabilization	Install riprap and other shoreline stabilization measures.	$225,000	Capital improvement	Parks Department	7/2018-6/2019	High
20	City Point Flood Mitigation Study	A study to prepare storm surge and sea level rise model for the City Point area to assess risk and propose protection and resilience strategies.	$425,000	TBD	City Plan	7/2017-8/2018	High

NORTH BRANFORD MITIGATION ACTIONS

Town of North Branford – Updated Mitigation Actions (2018-2023)							
Action #	**Action Title**	**Action Description**	**Estimated Cost**	**Potential Funding Source**	**Lead Department**	**Implementation Schedule**	**Priority**
1	Installation of Generator at Police Station	Installation of Replacement Stand-by Generator at North Branford Police Station.	$75,000	FEMA/DEEP	Emergency Operations / Police Department	April 2018-October 2018	High
2	Installation of Generator at Firehouse #1	Installation of Replacement Stand-by Generator at Company #1 Firehouse.	$50,000	FEMA/DEEP	Emergency Operations / Fire Department	February 2018-August 2018	High
3	Tree Removal	Removal of trees alongside roads and power lines.	$50,000	State of CT / Utilities / Local	DPW with State of CT / Utilities	Annual / Recurring Action	High
4	Farm River Flood Control Project	Construction of Farm River Flood Controls. Building a dam behind police station would help East Haven and North Branford – consideration should be given to a reduced project scope	$2,000,000 - 4,000,000	DEEP / NRCS / Town	NRCS / DEEP / FEMA	Undetermined (still TBD)	Medium
5	Public Education and Outreach	Increase public awareness regarding the potential for flooding, the areas to be affected, the need for and availability of flood insurance.	$40,000	Federal/State/Local	Engineering Department	July 2018-June 2023	Medium
6	Removal or Elevation of Structures	Remove or elevate existing structures in flood prone areas.	$50,000 - $500,000	FEMA / DEEP	Engineering Department	Undetermined (still TBD)	Medium
7	Culvert replacement at Arthur Road	Upgrade / Replace existing undersized culverts.	$250,000-500,000	DOT	Engineering Department	July 2020-October 2021	Medium
8	Upgrade bridge at Harrison Road	Upgrade / Replace existing bridge structure.	$500,000-750,000	DOT	Engineering Department	July 2021-October 2022	Medium
9	Elevate Route 80/West Pond Road Intersection	Elevate West Pond Road Extension in vicinity of Route 80.	$200,000	State of CT / Local	Engineering Department	July 2022-October 2023	Medium
10	Add CERT Team	Development and training of a CERT team.	$10,000	State of CT	Emergency Management	July 2020-July 2021	Medium
11	Open Space Acquisition	Open space acquisition.	$50,000 - $500,000	DEEP / Local	Town Manager	Undetermined (still TBD)	Low

NORTH HAVEN MITIGATION ACTIONS

Town of North Haven – Updated Mitigation Actions (2018-2023)							
Action #	Action Title	Action Description	Estimated Cost	Potential Funding Source	Lead Department	Implementation Schedule	Priority
1	Emergency Generators	Emergency Generators.	$100,000	FEMA Hazard Mitigation Grant Program	Fire Department	2018-2023 (in progress)	Very High
2	Pine River Road Project	Pine River Road homes flood due to the Muddy River overflowing.	$1,700,000	Federal/State/Local	DPW	2019-2023 (delayed)	Medium
3	Patten Road Project	Remedy flooding of Patten Road due to the Muddy River.	$1,000,000 - 5,000,000	CT DEEP and Town	DPW	2018-2023 (already partially completed)	Medium
4	Develop and Distribute Materials to Promote Back Flow Prevention Devices	Back flow systems have been installed on a couple of homes – could use additional education – such as flyers with sewer bills to recommend back flow systems for all homes.	Low	Town	DPW	2018-2023 (in progress)	Medium
5	Public Education on Dumping in Streams and Other Drainage Systems	Education needed about not dumping into streams – don't dump dog poop, leaves, trash, etc.	Low	Town	DPW	2018-2023 (in progress)	Medium
6	Inform Public of Charge in FEMA Mapping (May 16, 2017)	Education needed to let people know that they are now in a flood zone.	Low	Town and FEMA	DPW	2018-2023 (in progress)	Medium

ORANGE MITIGATION ACTIONS

Town of Orange – Updated Mitigation Actions (2018-2023)							
Action #	Action Title	Action Description	Estimated Cost	Potential Funding Source	Lead Department	Implementation Schedule	Priority
1	Tree Pruning and Removal	Continue to ensure proper tree pruning and removal along roadsides. Town roads have trees hanging over roadways. Hurricane winds could cause massive road closures and power outages.	Moderate	Grant funding (Federal/State/Local)	Town of Orange, Highway Department	July 2018-June 2023	Very High #1
2	EMAC Meetings	Hold EMAC meetings once a month to include discussions on mitigation planning.	Low	Town Funding	Emergency Management	July 2018-June 2023	Very High #2
3	Mallard Drive Access Improvements	Improve access to Mallard Drive neighborhood which becomes isolated during flood events. Currently can only be accessed from rear through retail plaza.	High	Grant funding (Federal/State/Local)	Town of Orange, Highway Department	July 2018-June 2023	Very High #3

WALLINGFORD MITIGATION ACTIONS

Town of Wallingford – Updated Mitigation Actions (2018-2023)							
Action #	**Action Title**	**Action Description**	**Estimated Cost**	**Potential Funding Source**	**Lead Department**	**Implementation Schedule**	**Priority**
1	Generator at Well No. 1 Production Well	Install emergency generator at the Well No. 1 production well to maintain water supply to the Town's system during power outages.	$60,000	Post-disaster Mitigation Funds	Water Division	12 months	High
2	Trunked Radio System	Need better interoperability for communication.	$6,000,000	Local	PD/FD	12-18 months	High
3	Emergency Response Planning and Exercising	Need to plan and exercise response to incidents.	N/A (staff time)	Local	PD/FD	3-12 Months	High
4	Generator at High School	Install emergency generator at the High School to support primary shelter.	$500,000	Post-disaster Mitigation Funds	Civil Preparedness/ EM	N/A	Medium
5	Enhance Public Notification System	Everbridge – have the system but people don't sign up. Design outreach program to encourage register.	N/A (staff time)	N/A	PD/FD	Through 2023	Medium
6	Maintaining Waterway	Coordination with DEEP on Warehouse Point (debris is raising water levels along Quinnipiac River).	N/A (staff time)	N/A	TBD	Through 2023	Low

WEST HAVEN MITIGATION ACTIONS

City of West Haven – Updated Mitigation Actions (2018-2023)							
Action #	Action Title	Action Description	Estimated Cost	Potential Funding Source	Lead Department	Implementation Schedule	Priority
1	Install Mechanized Tide Gates at Captain Thomas Boulevard on Cove River	Existing tide gates are deteriorated and not functioning properly. New self-regulating gates will provide better flow both upstream and downstream to reduce flooding and environmental enhancement of the tidal marsh.	$3,000,000	Federal / State / Local	Public Works	January 2019 - June 2020	High
2	Upgrade Sewage Pump Stations	Two pump stations are on the beach and below the 100-year base flood elevation. Six others are below the 100-year base flood elevation. These stations need to be upgraded to make them functional during storm events.	$18,700,000	Federal / State / Local	Public Works	July 2018 - June 2023	High
3	Outfall Pipe Reconstruction	Existing outfall pipe from Water Pollution Control Plant built in 1968 is in danger of damage due to exposure to daily tidal flows and storms and requires lowering to be under the seabed and needs enlarging to carry flows due to expected sea level rise.	$22,000,000	Federal / State / Local	Public Works	January 2019 - December 2022	High
4	Raise Beach Street Phase 2	Phase 2 will raise the Beach Street from Phase 1 terminus to Morse Avenue. This will provide access during storms and reduce flooding in the area.	$6,000,000	Federal / State / Local	Public Works	January 2019 - June 2020	High
5	Nourish Beach and Dune Restoration at Savin Rock Beach	Construct dune and nourish beach to protect the properties from frequent flooding during storms. Install crossovers on the dune for beach access and prevent dune damage.	$6,000,000	Federal / State / Local	Public Works	January 2019 - March 2020	High
6	Evaluate Road Access to Promote Economic Development of Commercial Properties in Floodplain	Evaluate access during the 100-year flood to commercial districts along Beach Street and Captain Thomas Boulevard. Determine inaccessible areas under current conditioning. Evaluate steps to provide access. Examine feasibility and costs - make recommendations.	$65,000	Federal/State/Local	Planning and Development	September 2018 - September 2019	High
7	Property Buyout 3rd Avenue Extension	Buy properties on 3rd Avenue Extension, Blohm Street in the Old Field Creek Floodplain and demolish houses.	$2,000,000	Federal	DPW/Planning	2018 - 2023	Medium

City of West Haven – Updated Mitigation Actions (2018-2023)							
Action #	**Action Title**	**Action Description**	**Estimated Cost**	**Potential Funding Source**	**Lead Department**	**Implementation Schedule**	**Priority**
8	Beach and Dune Management	Develop a beach and dune management plan to keep them in good condition for protection from flood hazards.	$50,000	Federal / State / Local	Public Works	January 2020 - October 2020	Medium
9	Sediment Basin at Peck Avenue	Construct sediment basin at Peck Avenue crossing of Old Field Creek to trap sediments.	$10,000	Local	Public Works	June 2020	Medium
10	Bayview Condos and First Avenue East Shoreline Green Infrastructure	Bayview Condominiums sit on a bluff with steep eroding slope causing hazard to the condominium. Slope stabilization with green infrastructure will reduce the hazard.	$500,000	Federal / State / Local	Public Works	June 2019 - June 2020	Medium
11	Study, design, and construct Cove River channel and retention basin at Greta Street and West Spring Street	West Spring Street and Greta Street intersection floods during rain storms and affects adjacent properties. Upstream retention basin will reduce flooding.	$2,500,000	Federal / State / Local	Public Works	January 2020 - December 2022	Medium
12	Improve bridge and channel on Cove River at Main Street and Painter Drive	Reconstruct bridge and lower utilities below the bed for better flow conveyance. Improve channel and enlarge culvert under driveway to apartments.	$2,000,000	Federal / State / Local	Public Works / State DOT	January 2022 - June 2023	Medium
13	Implement Woodruff Street Seawall Repair and Upgrade	Raise 100’ of seawall by 2’ and stabilize backyard to reduce erosion. This section gets damaged and yard eroded during storms.	$100,000	Federal / State / Local	Public Works	March 2020 - September 2020	Medium
14	Implementation of Floodplain Development Fee	Research BMPs of other municipalities using development fees. Develop draft concept for program. Review with local officials and business to determine how project could work for West Haven and appropriate fees. Work with Council and administration to implement development fee.	$20,000	Federal/State/Local	Planning and Development	December 2019 - December 2020	Medium
15	Adoption of Changes to Zoning Regulations	Review BMPs for relaxing height restrictions in the 100-year floodplain. Consider changes to "lookback period" in substantial improvements definition. Review BMPs of neighboring municipalities regarding freeboard in excess of 1 foot. Final step would be to develop list of text amendments,	$25,000	Local	Planning and Development	December 2020 - December 2021	Low

City of West Haven – Updated Mitigation Actions (2018-2023)							
Action #	**Action Title**	**Action Description**	**Estimated Cost**	**Potential Funding Source**	**Lead Department**	**Implementation Schedule**	**Priority**
		review with Planning and Zoning Commission, and schedule for public hearing and adoption.					
16	Installation of Signs to Educate the Public	Develop educational sign concept. Identify key locations. Develop design. Obtain public and commission review. Have signs manufactured. Install signs in key locations. Publicize through press releases and city website.	$25,000	Federal/State/Local	Planning and Development	December 2021 - December 2022	Low
17	Join CRS (CRP Action Pr6)	Assess joining the FEMA Community Rating System (CRS) Program.	Low	City / Department Operating Budget	Planning & Development Department	July 2020 - June 2021	Low
18	Coastal Resilience Education and Training for City Staff (CRP Action Ed1)	Perform education and training programs for municipal personnel and staff to identify nexuses between their areas of responsibility and coastal resilience	Low	City / Department Operating Budget; NROC	Mayor	July 2020 - June 2021	Low

WOODBRIDGE MITIGATION ACTIONS

Town of Woodbridge – Updated Mitigation Actions (2018-2023)							
Action #	Action Title	Action Description	Estimated Cost	Potential Funding Source	Lead Department	Implementation Schedule	Priority
1	Address Repetitive Loss Properties	A total of seven (7) repetitive loss properties have been recorded by FEMA with locations in Woodbridge. The Town shall review and validate the data provided for these properties, and as appropriate, will analyze the causes of flooding in the repetitive loss areas and evaluate potential mitigation strategies. This may include but is not limited to an outreach project to those addresses in repetitive loss areas to inform them of potential financial assistance for flood mitigation projects. Currently under NFIP policies. Severity of impact might be reduced due to remedial efforts downstream.	$1,000,000	N/A	TPZ/Building	July 2018 – July 2023	Medium
2	Generator for Animal Shelter	Current building is being modified with an addition. Generator and/or transfer switch needed.	$100,000	Grant	Animal Control	July 2018 – July 2019	Low

FUNDING SOURCES

As the appropriations related to Hurricane Sandy were exhausted in 2016 and 2017, the region will need to look toward the existing traditional state and federal funding sources as well as new and emerging funding sources to adapt to coastal hazards and become more resilient. Examples are described below.

NEW AND EMERGING SOURCES OF FUNDING

Connecticut Institute of Resilience and Climate Adaptation (CIRCA)

The Connecticut Institute for Resilience and Climate Adaptation (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 as a result of a changing climate. The mission of CIRCA) is to increase the resilience and sustainability of vulnerable communities along Connecticut's coast and inland waterways to the growing impacts of climate change on the natural, built, and human environment. The Institute helps coastal and inland floodplain communities in Connecticut and throughout the Northeast better adapt to changes in climate and also make their human-built infrastructure more resilient while protecting valuable ecosystems and the services they offer to human society.

Municipal Resilience Grant Program

CIRCA provides grants to municipal governments and councils of government for initiatives that advance resilience, including the creation of conceptual design, construction (demonstration projects or other) of structures, or the design of practices and policies that increase their resilience to climate change and severe weather. During each application cycle, up to $100,000 is available from CIRCA. Project proposals should develop knowledge or experience that is transferable to multiple locations in Connecticut and have well-defined and measurable goals. Additionally, preference is given to those projects that leverage multiple funding sources and that involve collaboration with CIRCA to address at least one of the following priority areas:

- Develop and deploy natural science, engineering, legal, financial, and policy best practices for climate resilience;
- Undertake or oversee pilot projects designed to improve resilience and sustainability of the natural and built environment along Connecticut's coast and inland waterways;
- Foster resilient actions and sustainable communities – particularly along the Connecticut coastline and inland waterways – that can adapt to the impacts and hazards of climate change; and
- Reduce the loss of life and property, natural system and ecological damage, and social disruption from high-impact events.

Matching Funds Program

CIRCA has considered requests from Connecticut municipalities, institutions, universities, foundations, and other non-governmental organizations for matching funds for projects that address the mission of the Institute. CIRCA matching funds are intended for grant proposals in preparation. You are not eligible to apply if primary funds have already been awarded.

The region should access CIRCA grants as they are made available and as applicable projects are advanced from this plan.

Northeast Regional Ocean Council (NROC)

NROC is a state/federal partnership that facilitates the New England states, federal agencies, regional

organizations, and other interested regional groups in their efforts to address ocean and coastal issues from a regional perspective. NROC builds capacity of New England communities through training and a small grants program to improve the region's resilience and response to impacts of coastal hazards and climate change. The region should access NROC grants as applicable projects are advanced from this plan.

National Oceanic and Atmospheric Administration (NOAA) Regional Coastal Resilience Grants

NOAA is committed to helping coastal communities address increasing risks from extreme weather events, climate hazards, and changing ocean conditions. To that end, NOAA's National Ocean Service is providing funding through competitive grant awards through the Regional Coastal Resilience Grants program. Awards are made for project proposals that advance resilience strategies, often through land and ocean use planning; disaster preparedness projects; environmental restoration; hazard mitigation planning; or other regional, state, or community planning efforts. Successful proposals demonstrate regional coordination among project stakeholders, leverage resources (such as funds, programs, partnerships, and others), and create economic and environmental benefits for coastal communities. Project results are evaluated using clear measures of success, with the end goal being improved preparation, response, and recovery.

Eligible applicants include nonprofit organizations; institutions of higher education; regional organizations; private (for profit) entities; and local, state, and tribal governments. Award amounts typically range from $500,000 to $1 million for projects lasting up to 36 months. Cost sharing through cash or in-kind matches is expected. Applicants must conduct projects benefiting coastal communities in one or more of the 35 U.S. coastal states or territories.

Because the Regional Coastal Resilience Grants program favors regional approaches to resilience problems, the region should pursue future funds with a group of municipalities or with the State of Connecticut.

Regional and National Design Competitions

Although the Rebuild By Design (RBD) competition and National Disaster Resilience Competition (NDRC) awards were announced in the last 3 years and the competitions are complete, they have provided a new model for screening and selecting resilience grant awardees in the United States. The region should keep abreast on future design competitions and consider pursuing these competitions as an individual applicant (if eligible), with a group of municipalities, or directly as an active participant with the State of Connecticut.

TRADITIONAL SOURCES OF FUNDING

Federal Emergency Management Agency (FEMA)

The Federal Emergency Management Agency (FEMA) makes grant funding for mitigation available via several programs. Jurisdictions are eligible to apply for funding through the State of Connecticut as subgrantees. Assistance with application development and project eligibility criteria are available online and through the State. The brief descriptions below provide an overview of the many grant opportunities available through FEMA.

Pre-Disaster Mitigation (PDM) Program

The Pre-Disaster Mitigation Program was authorized by Part 203 of the Robert T. Stafford Disaster Assistance and Emergency Relief Act (Stafford Act), 42 U.S.C. 5133. The PDM program provides funds to states, territories, tribal governments, communities, and universities for hazard mitigation planning and implementation of mitigation projects prior to disasters, providing an opportunity to reduce the nation's disaster losses through pre-disaster mitigation planning and the implementation of feasible, effective, and cost-efficient mitigation measures. Funding of pre-disaster plans and projects is meant to reduce overall risks to populations and facilities.

Federal funding for this nationally-competitive grant program is generally an annual allocation (subject to Congressional appropriation).

Flood Mitigation Assistance (FMA) Program

The FMA program was created as part of the National Flood Insurance Reform Act (NFIRA) of 1994 (42 U.S.C. 4101) with the goal of reducing or eliminating claims under the National Flood Insurance Program (NFIP). FEMA provides FMA funds to assist states and communities with implementing measures that reduce or eliminate the long-term risk of flood damage to buildings, homes, and other structures insurable under the NFIP. The long-term goal of FMA is to reduce or eliminate claims under the NFIP through mitigation activities. One limitation of the FMA program is that it is generally used to provide mitigation for structures that are insured or located in Special Flood Hazard Areas (SFHAs).

Federal funding for this nationally-competitive grant program is generally an annual allocation (subject to Congressional appropriation).

Hazard Mitigation Grant Program (HMGP)

The HMGP is authorized under Section 404 of the Robert T. Stafford Disaster Relief and Emergency Assistance Act. The HMGP provides grants to states and local governments to implement long-term hazard mitigation measures after a major disaster declaration. The purpose of the HMGP is to reduce the loss of life and property due to natural disasters and to enable mitigation measures to be implemented during the immediate recovery from a disaster. A key purpose of the HMGP is to ensure that any opportunities to take critical mitigation measures to protect life and property from future disasters are not "lost" during the recovery and reconstruction process following a disaster.

HMGP is available only in the months subsequent to a federal disaster declaration. Because the state administers HMGP directly, application cycles will need to be closely monitored after disasters are declared.

U.S Department of Housing and Urban Development (HUD)

The U.S. Department of Housing and Urban Development (HUD) provides Community Development Block Grant (CDBG) funding for projects that achieve local community and economic development objectives. Although administered by the State (Connecticut Department of Housing), eligible activities must still meet national program objectives that include benefiting low and moderate-income persons, eliminating slum and blight, or addressing an urgent need.

Community Development Block Grant (CDBG)

The CDBG program provides financial assistance to eligible municipalities in order to develop viable communities

by providing affordable housing and suitable living environments, as well as expanding economic opportunities, principally for persons of low and moderate income. It is possible that the CDBG funding program could be applicable for floodproofing and elevating residential and nonresidential buildings, depending on eligibility of those buildings relative to the program requirements. Other possible activities may include stormwater drainage improvements, the use of low impact development or green infrastructure to minimize hazard risks, and more.

CDBG Disaster Recovery (CDBG-DR)

The CDBG-DR program is designed to meet the unmet needs of communities most impacted by disasters including the costs of repairs, reconstruction and new construction that insurance, FEMA and any other sources of funding does not cover. After disaster declarations, and when funds are appropriated to HUD and the Connecticut Department of Housing, municipalities in the SCRCOG region should apply for CDBG-DR grants. The region has clearly been capable of securing CDBG-DR grants, as several previous, ongoing, and upcoming resilience projects are funded by this program.

Natural Resources Conservation Service (NRCS)

The NRCS provides technical assistance to individual landowners, groups of landowners, communities, and soil and water conservation districts on land use and conservation planning, resource development, stormwater management, flood prevention, erosion control and sediment reduction, detailed soil surveys, watershed/river basin planning and recreation, and fish and wildlife management. Financial assistance is available to reduce flood damage in small watersheds and to improve water quality. Two major programs are described below.

Emergency Watershed Protection Program (EWP)

Through the EWP program, the U.S. Department of Agriculture's NRCS can help communities address watershed impairments that pose imminent threats to lives and property. Most EWP work is for the protection of threatened infrastructure from continued stream erosion. NRCS may pay up to 75% of the construction costs of emergency measures. The remaining costs must come from local sources and can be made in cash or in-kind services. No work done prior to a project agreement can be included as in- kind services or part of the cost share. EWP projects must reduce threats to lives and property; be economically, environmentally, and socially defensible; be designed and implemented according to sound technical standards; and conserve natural resources.

Watersheds and Flood Prevention Operations

This program element contains two separate and distinct programs, "Watershed Operations" and "Small Watersheds." The purpose of these programs is to cooperate with state and local agencies, tribal governments, and other federal agencies to prevent damages caused by erosion, floodwater, and sediment and to further the conservation, development, utilization, and disposal of water and the conservation and utilization of the land. The objectives of these programs are to assist local sponsors in assessing conditions in their watershed, developing solutions to their problems, and installing necessary measures to alleviate the problems. Measures may include land treatment and structural and nonstructural measures. Federal cost sharing for installation of the measures is available. The amount depends upon the purposes of the project.

U.S. Army Corps of Engineers

The U.S. Army Corps of Engineers provides 100% funding for floodplain management planning and technical assistance to states and local governments under several flood control acts and the Floodplain Management Services (FPMS) Program. Specific programs used by USACE for mitigation are listed below.

Section 205 – Small Flood Damage Reduction Projects

This section of the 1948 Flood Control Act authorizes USACE to study, design, and construct small flood control projects in partnership with nonfederal government agencies. Feasibility studies are 100% federally funded up to

$100,000 with additional costs shared equally. Costs for preparation of plans and construction are funded 55% with a 35% nonfederal match. In certain cases, the nonfederal share for construction could be as high as 50%. The maximum federal expenditure for any project is $7 million.

Section 14 – Emergency Streambank and Shoreline Protection
This section of the 1945 Flood Control Act authorizes USACE to construct emergency shoreline and stream bank protection works to protect public facilities such as bridges, roads, public buildings, sewage treatment plants, water wells, and nonprofit public facilities such as churches, hospitals, and schools. Cost sharing is similar to Section 205 projects above. The maximum federal expenditure for any project is $1.5 million.

Section 208 – Clearing and Snagging Projects
This section of the 1954 Flood Control Act authorizes USACE to perform channel clearing and excavation with limited embankment construction to reduce nuisance flood damages caused by debris and minor shoaling of rivers. Cost sharing is similar to Section 205 projects above. The maximum federal expenditure for any project is $500,000.

Section 205 – Floodplain Management Services
This section of the 1950 Flood Control Act, as amended, authorizes USACE to provide a full range of technical services and planning guidance necessary to support effective floodplain management. General technical assistance efforts include determining the following: site-specific data on obstructions to flood flows, flood formation, and timing; flood depths, stages, or floodwater velocities; the extent, duration, and frequency of flooding; information on natural and cultural floodplain resources; and flood loss potentials before and after the use of floodplain management measures. Types of studies conducted under FPMS include floodplain delineation, dam failure, hurricane evacuation, flood warning, floodway, flood damage reduction, stormwater management, floodproofing, and inventories of flood prone structures. When funding is available, this work is 100% federally funded.

In addition, USACE also provides emergency flood assistance (under Public Law 84-99) after local and state funding has been used. This assistance can be used for both flood response and post-flood response. Corps assistance is limited to the preservation of life and improved property; direct assistance to individual homeowners or businesses is not permitted. In addition, USACE can loan or issue supplies and equipment once local sources are exhausted during emergencies.

U.S. Department of the Interior, Fish and Wildlife Service (FWS) Coastal Program
The Coastal Program is a voluntary, incentive-based program that provides direct technical assistance and financial assistance in the form of cooperative agreements to coastal communities and landowners to restore and protect fish and wildlife habitat on public and private lands. Coastal Program staff coordinate with project partners, stakeholders and other Service programs to identify geographic focus areas and develop habitat conservation priorities within these focus areas. Geographic focus areas are where the Coastal Program directs resources to conserve habitat for federal trust species. Project work plans are developed strategically, in coordination with partners, and with substantial involvement from Service field staff. Projects must advance FWS's mission, promote biological diversity, and be based upon sound scientific biological principles. Program strategic plans inform the types of projects funded under this opportunity.

U.S. Environmental Protection Agency (EPA) Healthy Communities Grant Program
The Healthy Communities Grant Program is EPA New England's main competitive grant program to work directly with communities to reduce environmental risks, protect and improve human health and improve the quality of life. The Healthy Communities Grant Program achieves this through identifying and funding projects that:

- Target resources to benefit communities at risk [areas needing to create community resilience, environmental justice areas of potential concern, sensitive populations (e.g. children, elderly, tribes, urban/rural residents, and others at increased risk)].

- Assess, understand, and reduce environmental and human health risks.
- Increase collaboration through partnerships and community-based projects.
- Build institutional and community capacity to understand and solve environmental and human health problems.
- Advance emergency preparedness and ecosystem resilience.
- Achieve measurable environmental and human health benefits.

To qualify as eligible projects under the Healthy Communities Grant Program, proposed projects must: (1) be located in and/or directly benefit one or more of the Target Investment Areas that include: Areas Needing to create Community Resilience, Environmental Justice Areas of Potential Concern, and/or Sensitive Populations.

CHAPTER 7. PLAN IMPLEMENTATION AND MAINTENANCE

SCRCOG staff and the Advisory Committee will implement the mitigation strategy and specific mitigation actions outlined in this Plan and update and maintain the Plan according to the guidelines below. SCRCOG staff and each of the participating jurisdictions will use the Plan's goals, as well as continued analysis of hazard risks and capabilities, to weigh the available resources against the costs and benefits for each mitigation action. The participating jurisdictions understand the value of this Plan and its positive mitigation impact and intend to continue updating this Plan and implementing the Plan's strategies.

PLAN IMPLEMENTATION

Each of the fourteen jurisdictions represented in this Plan, as well as SCRCOG staff, will implement portions of the Plan. They will collaborate on the completion of regional mitigation actions in addition to plan monitoring, evaluating and updating. They will independently implement their own jurisdiction-specific mitigation actions. Each mitigation action in this Plan is prioritized and assigned to a specific department or person for implementation. Timelines are given for each mitigation action where appropriate.

METHOD FOR CONTINUED REGIONAL PUBLIC PARTICIPATION

A5. Is there discussion of how the community(ies) will continue public participation in the plan maintenance process? 201.6(c)(4)(i)

Public participation was an integral part of this Plan's development. The Advisory Committee with SCRCOG's leadership is committed to continuing public outreach and public involvement. To this end, the public will remain involved in hazard mitigation, in the region and specifically in this Plan, via several vehicles. Public involvement will be fostered through the strategies listed below.

- The SCRCOG Mitigation Webpages (www.scrcog.org/regional-hazard-mitigation.html) will contain a copy of the plan and all updates.
- Public meetings will be advertised in local newspapers and local websites.
- Advisory Committee members will update their local constituency of Plan implementation and update progress.
- Copies of this plan will be available in each jurisdiction's Town Hall or other venue for public view.

Note: The previous plan called for assessing the feasibility of a mitigation newsletter. SCRCOG determined that it is not feasible at this time.

METHOD AND SCHEDULE FOR MONITORING, EVALUATING AND UPDATING THE MITIGATION PLAN

A6. Is there a description of the method and schedule for keeping the plan current (monitoring, evaluating and updating the mitigation plan within a 5-year cycle)? FEMA Requirement §201.6(c)(4)(i)

The Advisory Committee has agreed to meet annually, at a minimum, to review the Plan. SCRCOG staff will host these meetings. All of the SCRCOG jurisdictions will be invited to participate in these meetings.

Three key methods to keeping this Plan current are monitoring, evaluating and updating the Plan. FEMA defines these the following way[406]:

- Monitoring: Tracking the implementation of the plan over time.
- Evaluating: Assessing the effectiveness of the plan at achieving its stated purpose and goals.
- Updating: Reviewing and revising the plan at least once every five years.

MONITORING

The *Mitigation Action Progress Report* form, shown in Appendix E, will be distributed to the Advisory Committee and available on the SCRCOG Mitigation Planning webpage. It will also be available as a Google Form, for those Advisory Committee members who prefer this digital format. This form will be used by representatives from departments assigned with the responsibility for action implementation to track and report on the progress of mitigation actions included in this Plan. Actions not included in this Plan will be added to the Plan via completion of the *Mitigation Action Progress Report* form. Advisory Committee members are responsible for collecting additional mitigation actions from their jurisdiction and completing the form as needed. SCRCOG will prompt Advisory Committee members to complete updated Mitigation Action Progress Report forms on an annual basis. This request will be made to coincide with annual Advisory Committee meetings the SCRCOG will host. The input received on the forms will be entered into the Mitigation Action Tracker by SCRCOG staff. The Mitigation Action Tracker will be sent to each jurisdiction for their reference.

EVALUATING

SCRCOG's Regional Planner and the Advisory Committee will use the *Plan Update Evaluation Worksheet (shown in Appendix E)* to evaluate this Plan and make recommendations for future Plan updates and enhancements. The worksheet will be completed approximately three months after this Plan is adopted by all jurisdictions. It will then be completed annually with any updates to the plan.

UPDATING

SCRCOG has committed to maintaining this Plan by applying for funding toward plan updates. SCRCOG's Regional Planner will take the lead in this effort. SCRCOG staff will invite all of their participating jurisdictions to participate in future multi-jurisdiction plan updates. In the event of a large-scale disaster, SCRCOG staff will review the Plan with the impacted jurisdictions to verify the Plan's accuracy. A meeting will be convened, with all jurisdictions, and the Plan will be updated as necessary. **Figure 7-96** shows the annual method and schedule for monitoring, evaluating, and updating the Plan.

[406] Local Mitigation Planning Handbook, FEMA March 2013. p. 7-1.

August 2018 - July 2019

- SCRCOG hosts Advisory Committee Meeting following any large scale disasters to discuss potential additional mitigation actions.
- SCRCOG hosts annual Advisory Committee Meeting in October.
- Advisory Committee proceeds with mitigation action implementation and considers additional mitigation projects.
- Advisory Committee members incorporate this Plan into other jurisdiction plans.
- SCRCOG seeks funding for regional mitigation projects.
- SCRCOG initiates mitigation planning review process for lessons learned.

August 2019 - July 2020

- SCRCOG hosts Advisory Committee Meeting following any large scale disasters to discuss potential additional mitigation actions.
- SCRCOG hosts annual Advisory Committee Meeting in October..
- Advisory Committee proceeds with mitigation action implementation and considers additional mitigation projects.
- Advisory Committee members incorporate this Plan into other jurisdiction plans.
- SCRCOG seeks funding for regional mitigation projects.
- SCRCOG maintains communication with all 15 municipalities to incorporate their mitigation plans into one regional plan.

August 2020 - July 2021

- SCRCOG hosts Advisory Committee Meeting following any large scale disasters to discuss potential additional mitigation actions.
- SCRCOG hosts annual Advisory Committee Meeting in October.
- Advisory Committee proceeds with mitigation action implementation and considers additional mitigation projects.
- Advisory Committee members incorporate this Plan into other jurisdiction plans.
- SCRCOG seeks funding for regional mitigation projects.
- SCRCOG maintains communication with all 15 municipalities to incorporate their mitigation plans into one regional plan.

August 2021 - July 2022

- SCRCOG hosts Advisory Committee Meeting following any large scale disasters to discuss potential additional mitigation actions.
- SCRCOG hosts annual Advisory Committee Meeting in October.
- Advisory Committee proceeds with mitigation action implementation and considers additional mitigation projects.
- Advisory Committee members incorporate this Plan into other jurisdiction plans.
- SCRCOG seeks funding for Plan update.
- SCRCOG invites all 15 municipalities to participate in next regional plan. SCRCOG secures Resolutions of commitment.

August 2022 - July 2023

- SCRCOG hosts Advisory Committee Meeting following any large scale disasters to discuss potential additional mitigation actions.
- SCRCOG leads Plan update process similar to process used for this Plan.
- SCRCOG hosts a minimum of 4 Advisory Committee Planning Meetings.
- SCRCOG incorporates outreach strategy, which includes jurisdiction meetings, public workshops and public surveys.
- SCRCOG seeks funding for regional mitigation projects.
- SCRCOG hosts meetings for additional stakeholders such as CL&P, The Nature Conservancy, and the Regional Planning Commission.

Figure 7-96 Method and Schedule for Updating the Plan

PLAN INCORPORATION INTO EXISTING PLANNING MECHANISMS

C6. Does the Plan describe a process by which local governments will integrate the requirements of the mitigation plan into other planning mechanisms, such as comprehensive or capital improvement plans, when appropriate? (Requirement §201.6(c)(4)(ii))

Integrating components of this Plan with other plans is the responsibility of each participating jurisdiction. Whenever appropriate, the jurisdictions will integrate elements of this Plan into local planning mechanisms, including Plans of Conservation and Development, Emergency Operations Plans, Floodplain Management and Zoning Regulations, and Capital Improvement Plans. Additionally, SCRCOG will integrate elements of this Plan into regional planning documents, such as the South Central Region: Plan of Conservation and Development and Long-Range Transportation Plan, as appropriate. The integration process and schedule of incorporating elements of this Plan will vary based on the particular plan's update cycle. The yearly mitigation meetings will provide an opportunity to track the progress on the integration of this Plan into local planning mechanisms.

Per Section 8-23 of the Connecticut General Statutes, the jurisdictions will update their plans of conservation and development (POCD) at least once every ten years. Jurisdictions were exempt from this requirement between July 1, 2010 and June 30, 2013 due to the development of the *State of Connecticut Conservation and* Development Policies Plan, 2013-2018. Chapter 5: Capability Assessment details each of the jurisdictions Plans of Conservation and Development and the date it was updated. Many of these plans were updated since the original South Central Regional Multi-Jurisdiction Hazard Mitigation Plan and include reference to this Plan. The Regional Framework for Coastal Resilience for Southern Connecticut and the jurisdiction specific coastal resilience plans are include actions integrate with the original version of this Plan. Their future iterations will include updated content from this Plan.

Following Plan adoption, SCRCOG will instruct the Advisory Committee at their first annual meeting how to identify locally-specific opportunities to integrate the relevant components of this Plan into other local plans and planning processes. To assist in this effort, SCRCOG staff will utilize FEMA's publication, titled *Integrating Hazard Mitigation Into Local Planning: Case Studies and Tools for Community Officials*. The recommended process in FEMA's publication includes the following five steps:

1. Assess your community's planning framework with a lens for resilience.
2. Inform and engage local leadership, staff, and stakeholders.
3. Establish an integration agenda of resilient community principles and actions.
4. Be opportunistic.
5. Monitor, measure, report, and repeat.

At the moment, it is deemed appropriate for SCRCOG staff to lead the effort to maintain this Multi-Jurisdiction Plan and future regional plans. However, individual jurisdictions have the authority to choose their level of participation in this Plan.

PLAN ADOPTION

E2. For multi-jurisdictional plans, has each jurisdiction requesting approval of the plan documented formal plan adoption? FEMA Requirement §201.6(c)(5)

Each participating jurisdiction completed local plan adoption procedures following the issuance of FEMA's Approved Pending Adoption notification. The dates each jurisdiction and the SCRCOG Board adopted the plan on page 5. Also included in this section are copies of the Adoption Resolutions.

RESOURCES

- "About the City of Milford." City of Milford Connecticut.
- "About the Trail." (2017). Farmington Canal Rail to Trail Association.
- "Air Traffic Activity System (ATADS)." (2017). Federal Aviation Administration.
- "Connecticut Statewide Comprehensive Outdoor Recreation Plan." (2016). Connecticut Department of Energy and Environmental Protection.
- "Early History." (2017). Town of East Haven Connecticut.
- "Future of Tweed: Letter from the Mayor of New Haven." (2015). Tweed New Haven: Southern Connecticut's Airport.
- "Hamden Plan of Conservation and Development." (2004).
- "Hammonasset Beach State Park." (2017). Department of Energy and Environmental Protection.
- "Kinder Morgan in Connecticut." (2015). Kinder Morgan.
- "Living on the Shore Tidal Wetlands." (2016). Connecticut Department of Energy & Environmental Protection.
- "Mayor's Office." (2017). Town of East Haven Connecticut.
- "Naugatuck State Forest – Quillinan Reservoir." RootsRated.
- "Offices and Hours." (2017). Connecticut Water.
- "Our Town." (2005). West Haven Historical Society.
- "Port Authority." (2017). The City of New Haven.
- "Rockland Preserve." (2017). Madison Connecticut.
- "Savin Rock Festival." West Haven Connecticut.
- "Service Area Map." (2017). South Central Connecticut Regional Water Authority.
- "Sleeping Giant Park Association." (2016).
- "South Central Region, CT: Demographic & Socioeconomic Trends." (2017). South Central Regional Council of Governments.
- "Southern CT: Regional Framework for Coastal Resilience." (2017). South Central Regional Council of Governments – MetroCOG, Nature Conservancy.
- "Totoket Historical Society." (2017). Totoket Historical Society.
- "Tweed Airport Timeline." (2017). Tweed New Haven: Southern Connecticut's Airport.
- "Tweed-New Haven." (2017). Airport IQ 5010.
- "Utility by Town List." (2014). State of Connecticut.
- "Water and Sewer Divisions." (2017). Wallingford Connecticut.
- A Multi-jurisdictional Plan for the former Windham Region Council of Governments (WINCOG) Towns of Columbia, Coventry, Lebanon, Mansfield, Willington, and Windham, Hazard Mitigation Plan Update, 2015
- A Paddling Guide to the Housatonic River in Connecticut." (2012). The Housatonic Valley Association.
- About Bethany." (2017). Bethany Connecticut.
- Blake, William P. (1888). "History of the town of Hamden, Connecticut." Price, Lee & Co.
- Capitol Region Natural Hazards Mitigation Plan Update, 2014-2019
- City of Milford, Coastal Resilience Plan, March 2016
- City of West Haven, Coastal Resilience Plan, March 2017
- Connecticut Department of Energy & Environmental Protection, GIS Data http://www.ct.gov/deep/cwp/view.asp?a=2698&q=322898&deepNav_GID=1707%20
- Connecticut Department of Energy & Environmental Protection, the Connecticut Sea Grant and the University of Connecticut Center for Land Use Education and Research. July 2014. Analysis of Shoreline Change in Connecticut: 100+ Years of Erosion and Accretion
- Connecticut Department of Energy & Environmental Protection. Dams, http://www.ct.gov/deep/cwp/view.asp?a=2720&q=325634&deepNav_GID=1625
- Connecticut Department of Energy & Environmental Protection. Fire Statistics. Personal Communication with Tim Ellingson, Forestry Division Bureau of Natural Resources, 04/17/2018

- Connecticut Department of Energy & Environmental Protection. High Hazard & Significant Hazard Dams, http://www.ct.gov/deep/cwp/view.asp?a=2720&q=394032&deepNav_GID=1625
- Connecticut Department of Energy and Environmental Protection and Division of Emergency Services and Public Protection, 2014 Connecticut Natural Hazard Mitigation Plan Update.
- Connecticut Water Planning Council (Public Utilities Regulatory Authority, Department of Energy and Environmental protection, Office of Policy & Management, and Department of Public Health), 2018. Connecticut State Water Plan. Prepared by CDM Smith and Milone & MacBroom.
- Connecticut's Natural Hazard Mitigation Plan Update, 2014, Table 3-7 Local Plans and Regulations Used by Communities.
- Conservation and Development Policies, The Plan for Connecticut, 2017
- Decennial Census 1900-2010. (2010). U.S. Census Bureau.
- Disaster Mitigation Act of 2000, Pub. L. 106-390, as amended.
- Donato, Simon. "History of the 'Flats' in the West River Valley." (2013).
- Federal Emergency Management Agency (FEMA). *What is Mitigation?* Accessed January 2014 http://www.fema.gov/what-mitigation
- Federal Emergency Management Agency, 2012. Federal Emergency Management Agency Local Mitigation Planning Handbook, Washington, DC. Available at: http://www.fema.gov/hazard-mitigation-planning-resources
- Federal Emergency Management Agency, May 16, 2017. Flood Insurance Study, New Haven County, Connecticut (All Jurisdictions). Flood Insurance Study Number 09009CV001D Version 2.3.3.2. Digital Flood Insurance Rate Maps (DFIRMs) for New Haven County, 7/8/2013
- Federal Emergency Management Agency. Disaster Declarations. http://www.fema.gov/disasters
- Federal Emergency Management Agency. Policy & Claim Statistics for Flood Insurance. https://www.fema.gov/policy-claim-statistics-flood-insurance
- FEMA Flood Insurance Study, New Haven County, CT." (2010). Federal Emergency Management Agency.
- FEMA. *Disaster Mitigation Act of 2000.* Accessed January 2014 http://www.fema.gov/media-library/assets/documents/4596?id=1935.
- FEMA. *Multi-Hazard Mitigation Planning.* Accessed January 2014 http://www.fema.gov/multi-hazard-mitigation-planning
- Freeman, Paul. "Bethany Airport, Bethany CT." (2017). Abandoned & Little-Known Airfields: Western Connecticut.
- Giacobbe, Alyssa. (2017). "Dream Town: Madison, Connecticut." Coastal Living.
- Gregan, Janet S. "North Branford and Northford 1950-1981." (2001). Images of America. Arcadia Publishing.
- Gregory A. Zielinski, Institute for Quaternary and Climate Studies, University of Maine – Classification Scale for Severe Winter Storms and Nor'easters
- Guilford Facilities, Parks & Beaches." (2017). The Town of Guilford.
- Hammonasset Beach State Park." (2017). Department of Energy and Environmental Protection.
- Hazus-MH default inventories.
- Hughes, Sarah E. (1908). "History of East Haven."
- Intergovernmental Panel on Climate Change, 2007. Climate Change 2007.
- Local Mitigation Plan Review Guide, October 1, 2011.
- Local Mitigation Planning Handbook, FEMA March 2013.
- Local Mitigation Planning Handbook, Washington. (2012). Federal Emergency Management Agency. Retrieved from http://www.fema.gov/hazard-mitigation-planning-resources
- Marlon, J., Rosenthal, S., Feinberg, G., Pal, S. and Leiserowitz, A. (2015). Hurricane Perceptions of Coastal Connecticut Residents: October, 2014. Yale University. New Haven, CT: Yale Project on Climate Change Communication
- Milford History." City of Milford Connecticut.
- National Geophysical Data Center / World Data Service (NGDC/WDS): Global Historical Tsunami Database. National Geophysical Data Center, NOAA. doi:10.7289/V5PN93H7

- National Oceanic and Atmospheric Administration, National Centers for Environmental Information. Historical Palmer Drought Indices. https://www.ncdc.noaa.gov/temp-and-precip/drought/historical-palmers/
- National Oceanic and Atmospheric Administration, National Centers for Environmental Information. RSI Classification Scale for Severe Winter Storms. https://www.ncdc.noaa.gov/snow-and-ice/rsi/
- National Oceanic and Atmospheric Administration, National Hurricane Center. Saffir-Simpson Hurricane Wind Scale. https://www.nhc.noaa.gov/aboutsshws.php
- National Oceanic and Atmospheric Administration, National Ocean Service Office for Coastal Management. Historical Hurricane Tracks https://coast.noaa.gov/hurricanes
- National Oceanic and Atmospheric Administration, National Weather Service. Heat Index. https://www.weather.gov/safety/heat-index
- National Oceanic and Atmospheric Administration, National Weather Service. Wind Chill Chart. https://www.weather.gov/safety/cold-wind-chill-chart
- National Oceanic and Atmospheric Administration, National Weather Service. The Enhanced Fujita Scale. https://www.weather.gov/oun/efscale
- National Oceanic and Atmospheric Administration. Tides and Currents: Sea level Trends. https://tidesandcurrents.noaa.gov/sltrends/sltrends.html
- National Register of Historic Places database at: http://nrhp.focus.nps.gov/natreghome.do?searchtype=natreghome
- Northeast Regional Climate Center, Cornell University. http://www.nrcc.cornell.edu/
- O'Donnell J., (2017) Sea Level Rise and Coastal Flood Risk in Connecticut. Draft Report to the CT Department of Energy and Environmental Protection
- O'Leary, Mary. (2015). "New Connecticut Port Authority to focus on boosting maritime economy." New Haven Register.
- Parris, A., P. Bromirski, V. Burkett, D. Cayan, M. Culver, J. Hall, R. Horton, K. Knuuti, R. Moss, J. Obeysekera, A. Sallenger, and J. Weiss. 2012. Global Sea Level Rise Scenarios for the US National Climate Assessment. NOAA Tech Memo OAR CPO-1. 37
- Radeloff, V.C., R.B. Hammer, S.I Stewart, J.S. Fried, S.S. Holcomb, and J.F. McKeefry. (2005). The Wildland Urban Interface in the United States. Ecological Applications 15: 799-805.
- SCRCOG Demographic and Socioeconomic Trends, March 2017
- South Central Region, CT: Demographic & Socioeconomic Trends." (2017). South Central Regional Council of Governments.
- South Central Region: Plan of Conservation & Development 2018-2023 DRAFT Update." (2018). South Central Regional Council of Governments.
- South Central Regional Long Range Transportation Plan 2015-2040." (2015). South Central Regional Council of Governments.
- Southern Connecticut Regional Framework for Coastal Resilience, Final Report July 2017
- Stowe, Stacy. (2006). "Living Half a Mile off the Coast." The New York Times.
- Sweet, W., R. Kopp, C Weaver, J. Obeysekera, R. Horton, E. Thieler, and C. Zervas, 2017. Global and Regional Sea Level Rise Scenarios for the United States. NOAA Technical Report NOS CO-OPS 083
- The Northeast Corridor." (2017). Northeast Corridor Commission.
- Town of Branford, Coastal Resilience Plan, November 2015
- Town of Guilford, Coastal Resilience Plan, September 2012
- Town of Madison, Coastal Resilience Plan, May 2016
- Town/City Websites
- United States Census Bureau. 2010 Census. http://www.census.gov.
- United States Geological Survey. Earthquakes. https://earthquake.usgs.gov/earthquakes/
- United States Geological Survey. The Modified Mercalli Intensity Scale. https://earthquake.usgs.gov/learn/topics/mercalli.php
- United States Global Change Research Program. Global Climate Change Impacts in the United States, Thomas R. Karl, Jerry M. Melillo, and Thomas C. Peterson, (eds.). Cambridge University Press, 2009.

- Utility by Town List." (2014). State of Connecticut.
- Wallingford Mitigation Plan 2017
- Welcome to the Town of Branford, Connecticut." (2017). Branford, Connecticut; and "History of Branford." (2017). Branford, Connecticut.
- West Rock Ridge State Park." (2017). Department of Energy & Environmental Protection. 2002-2017, "East Rock Park." Connecticut: Still Revolutionary.

APPENDICES

APPENDIX A. PLANNING PROCESS SUPPORT MATERIALS

FACT SHEET

SCRCOG

SOUTH CENTRAL REGIONAL COUNCIL OF GOVERNMENTS

Planning for Our Region's Future

Bethany Branford East Haven Guilford Hamden Madison Meriden Milford
New Haven North Branford North Haven Orange Wallingford West Haven Woodbridge

Carl J. Amento, Executive Director

South Central Regional Multi-Jurisdiction Hazard Mitigation Plan Update

SCRCOG is updating the South Central Region: Multi-Jurisdiction Hazard Mitigation Plan (HMP). It incorporates the previous Regional HMP with the addition of East Haven, Guilford, Milford and New Haven. Jamie Caplan Consulting LLC with support from Milone & MacBroom and Punchard Consulting will lead the planning effort on behalf of SCRCOG.

Federal Emergency Management Agency (FEMA) Requirements Met
The purpose of the South Central Region Multi-Jurisdiction Hazard Mitigation Plan Update is to provide the Region with a comprehensive examination of all natural hazards affecting the area and to provide a framework for informed decision-making regarding the selection of cost-effective mitigation actions. These mitigation actions, when implemented, will reduce the Region's risk and vulnerability from natural hazards. The hazard mitigation plan is a prerequisite for the municipalities to apply for state and federal mitigation grant funding.

"Reduce or eliminate risk to people and property from natural hazards."

14 Municipalities Participating

The South Central Regional Council of Governments (SCRCOG) has been awarded a grant from the Connecticut Department of Emergency Services and Public Protection, Division of Emergency Management and Homeland Security (DESSP/DEMHS) to develop a **Multi-Jurisdiction Hazard Mitigation Plan Update** for Bethany, Branford, East Haven, Guilford, Hamden, Madison, Milford, New Haven, North Branford, North Haven, Orange, Wallingford, West Haven and Woodbridge.

Opportunities for the Public to Participate

We hope you will get involved in the mitigation planning process. For more information on how you can. please visit the project webpage at http://scrcog.org/regional-planning/regional-hazard-mitigation/.

Advisory Committee
SCRCOG has formed an Advisory Committee to help lead the project, consisting of representatives from participating municipalities and other targeted stakeholders in the Region. The Advisory Committee will meet with SCRCOG staff and the consulting team a minimum of four times during the planning process. Participation by the Advisory Committee ensures continuous involvement by local staff and stakeholders

in the development of the Plan. The Advisory Committee meetings will allow for valuable input from the stakeholders and will keep them apprised of project progress.

Severe Winter Storms impact Connecticut

Public Opinion Survey

This survey provides an opportunity for everyone in the planning area to share his or her opinions and participate in the mitigation planning process. The information provided will help the Advisory Committee to better understand local concerns and issues as expressed by citizens of the Region, and can lead to mitigation activities that should help lessen the impacts of future disasters. Participation in this survey is voluntary and none of the information provided will be attributed to individuals directly. The survey is located on our website and will only take about 5 minutes to complete.

Municipality and Public Meetings

The consulting team and SCRCOG staff will meet with municipal representatives and other stakeholders in each of the fourteen participating municipalities to gain information and insights that are unique to each individual jurisdiction. These stakeholders may include local or regional agencies, academia or private industry. These meetings will give the planning team an opportunity to gather municipal data and to better represent the unique risks, capabilities and mitigation actions in each municipality.

Hazard Mitigation

Hazard mitigation is sustained action taken to reduce or eliminate long-term risk to people and their property from hazards.

Hazard Mitigation Plans

Hazard Mitigation Plans form the foundation for a community's long-term strategy to reduce disaster losses and break the cycle of disaster damage, reconstruction, and repeated damage.

Hazard Mitigation Planning

The planning process is as important as the plan itself. It creates a framework for risk-based decision making to reduce damages to lives, property, and the economy from future disasters.

Floods happen in Connecticut

For more information:

Eugene Livshits, Senior Regional Planner
203-466-8626
elivshits@scrcog.org

http://scrcog.org/regional-planning/regional-hazard-mitigation/

KICK-OFF MEETING

AGENDA

South Central Regional Council of Governments
Multi-Jurisdiction Hazard Mitigation Plan Update

Kick-off Meeting Agenda

May 2, 2017

1) Project Scope and Expected Goals and Deliverables

2) Project Tasks and Assumptions
   1. Planning Process
      a) Municipality Involvement
      b) Public Outreach
      c) Stakeholder Involvement
   2. Risk Assessment
      a) Data Collection
   3. Capability Assessment
   4. Hazard Mitigation Strategy
      a) Consistency with plans in the region
   5. Plan Maintenance Process
   6. Update Adoption and Approval

3) Project Timeline

4) Next Steps
   a) Work Plan
   b) Project Fact Sheet
   c) Planning Team Meetings
   d) Forming and Informing the Advisory Committee
   e) Advisory Committee Meeting for June (June 20 or 21?)
   f) Data Collection
   g) Webpage

MEETING SIGN-IN SHEET – KICK-OFF MEETING

Project:	South Central CT Multi-Jurisdiction Hazard Mitigation Plan	**Meeting Date:**	May 2, 2017
Facilitator:	Eugene Livshits	**Place/Room:**	SCRCOG Offices

Name	Position	Phone	E-Mail
David Murphy	MMI (Sub)	203 271-1773	davem@milneandmacbroom.com
Eugene Livshits	SCRCOG	203-466-8626	elivshits@scrcog.org
Rebecca Andreucci	SCRCOG	203-466-8601	randreucci@scrcog.org
Jamie Caplan	JCC - Prime	413-586-0867	jamie@jamiecaplan.com

Page 1 of 1

WORK PLAN

SCRCOG
SOUTH CENTRAL REGIONAL COUNCIL OF GOVERNMENTS
Planning for Our Region's Future

Bethany Branford East Haven Guilford Hamden Madison Meriden Milford
New Haven North Branford North Haven Orange Wallingford West Haven Woodbridge

Carl J. Amento, Executive Director

South Central Regional Multi-Jurisdiction Hazard Mitigation Plan Update WORK PLAN AND SCHEDULE

Task 1. Planning Process

Task 1 includes five sub-tasks that span the entire project timeline of forty weeks of active work, and twenty weeks of plan review and adoption. These tasks are:

1. Project Initiation
2. Develop Public Outreach Strategy
3. Facilitate Advisory Committee Meetings
4. Conduct Public Outreach
5. Document Planning Process

Task 2. Risk Assessment

Task 2 Risk Assessment includes five sub-tasks:

1. Data Collection and Analysis
2. Hazard Profiles and Mapping
3. Inventory of Community Assets
4. Vulnerability Assessment
5. Summarize Findings and Conclusions

Task 3. Capability Assessment

Task 3. Capability Assessment includes two subtasks:

1. Review Existing Capabilities
2. Summarize Findings and Conclusions

Task 4. Hazard Mitigation Strategy

Task 4. Hazard Mitigation Strategy includes the following five sub-tasks:

1. Update Goals, Objectives and Actions
2. Identification and Analysis of Mitigation Actions
3. Prioritize Mitigation Actions
4. Prepare Mitigation Action Plans
5. Document Mitigation Strategy

Task 5. Plan Maintenance Process

Task 5. Includes the Plan Maintenance Process, as required by FEMA. This process details how the plan will be reviewed, used and updated by the region. The following subtasks are part of the Plan Maintenance Process:

1. Plan Implementation Procedures
2. Plan Review and Update Procedures
3. Continued Public Involvement Procedures
4. Document Plan Maintenance Process

Task 6. Adoption and Approval

Task 6. Adoption and Approval includes four sub-tasks:

1. Draft the HMP Update
2. Municipal and Public Review and Revisions
3. Final Draft of HMP Update for CT DESPP Review and Revision
4. Final Draft of HMP Update for FEMA Review and Approval

Deliverables

Our schedule will result in a FEMA Approved Multi-Jurisdiction Hazard Mitigation Plan Update. The final project deliverables include:

1. Monthly Progress Reports.
2. Draft Mitigation Plan Chapters for Review by SCRCOG and the Advisory Committee.
3. Draft Plan for Review SCRCOG, Advisory Committee and the public.
4. Digital copies of all tabular data, maps, mapping data, GIS data, or other geospatial information used in the development of the mitigation plan.
5. Digital copies of the Draft and Final versions of the Hazard Mitigation Plan.
6. Two printed and bound color copies of the Hazard Mitigation Plan.
7. Electronic copies of all meeting schedules, agendas, notes, sign-in sheets and presentations.

SCRCOG

SOUTH CENTRAL REGIONAL COUNCIL OF GOVERNMENTS

Planning for Our Region's Future

Bethany Branford East Haven Guilford Hamden Madison Meriden Milford
New Haven North Branford North Haven Orange Wallingford West Haven Woodbridge

Carl J. Amento, Executive Director

Tasks and Deliverables	2017								2018					
	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun
Task 1. Planning Process														
Advisory Committee Meetings		✓		✓		✓			✓					
Municipality Meetings			✓	✓										
Public Workshops						✓			✓					
Task 2. Risk Assessment														
Draft Risk Assessment						✓								
Task 3. Capability Assessment														
Draft Capability Assessment						✓								
Task 4. Hazard Mitigation Strategy														
Draft Mitigation Strategy								✓						
Task 5. Plan Maintenance Process														
Draft Plan Maintenance Process									✓					
Task 6. Adoption and Approval														
Municipal and Public Review and Revisions										✓				
Final Draft of HMP Update for CT DESPP Review and Revision											✓	✓		
Final Draft of HMP Update for FEMA Review and Approval													✓	✓

ADVISORY COMMITTEE MEETINGS

JUNE 21, 2017

SCRCOG
SOUTH CENTRAL REGIONAL COUNCIL OF GOVERNMENTS
Planning for Our Region's Future

Bethany Branford East Haven Guilford Hamden Madison Meriden Milford
New Haven North Branford North Haven Orange Wallingford West Haven Woodbridge

Carl J. Amento, Executive Director

South Central Regional Multi-Jurisdiction
Hazard Mitigation Plan Update
AGENDA
June 21, 2017 Advisory Committee Meeting

Introductions and Binders

Project Introduction
- Mitigation Plan Update
- Benefits and Challenges of Adding Four Municipalities
- Timeline

Planning Process in Detail
- Planning Process Overview
  - Role of the Advisory Committee
- Public Outreach and Stakeholder Engagement
  - Municipality Meetings
  - Public Meetings
- Risk Assessment
  - Data Collection
- Capability Assessment
- Mitigation Strategy

Next Steps
- Municipality Meetings
- August Advisory Committee Meeting

For more information:
Eugene Livshits, Senior Regional Planner
203-466-8626
elivshits@scrcog.org
http://scrcog.org/regional-planning/regional-hazard-mitigation/

MEETING SIGN-IN SHEET – ADVISORY COMMITTEE

Project:	South Central Regional Multi-Jurisdiction Hazard Mitigation Plan Update	**Meeting Date:**	June 21, 2017
Facilitator:	Eugene Livshits and Jamie Caplan	**Place/Room:**	SCRCOG Offices – West Haven

Name	Title	Organization	Phone	E-Mail	Initials
David Anderson		Madison		andersond@madisonct.org	
Susmitha Attota		New Haven		SAttota@newhavenct.net	
Jonathan Bodwell		North Haven		bodwell.jonathan@town.north-haven.ct.us	JB
Warren Connors		Woodbridge		wconnors@woodbridgect.org	KH
Karyn Gilvarg		New Haven		kgilvarg@newhavenct.net	
Donna Hall		New Haven		dhall@newhavenct.net	
Richard Heidgerd		Wallingford		rheidgerd@wallingfordfd.com	
Robert Hiza		Orange		rhiza@orange-ct.gov	
Clark Hurlburt		Bethany		clarkhurlburt@sbcglobal.net	CH
Isabel Kearns		Bethany		IKearns@Bethany-ct.com	
Kevin Magee	Environmental Planner	Guilford	203-453-8074	mageek@ci.guilford.ct.us	
Matthew Marcarelli		East Haven		mmarcarelli@easthavenfire.com	
Meg McGaffin	GIS Analyst	Milford	203-701-4476	mmcgaffin@ci.milford.ct.us	
Michael Ott		Madison		ottm@madisonct.org	
Fred Palmer		Orange		fcpalmer@juno.com	
MaryRose Palumbo	Inland Wetland Agent	Milford	203-701-4452	M Palumbo MARYROSEP@ci.milford.ct.us	

Name	Title	Organization	Phone	E-Mail	Initials
Janice Plaziak	Town Engineer	Branford	203-315-0606	jplaziak@branford-ct.gov	
James Portley		Guilford		portleyJ@ci.guilford.ct.us	
Abdul Quadir	City Engineer	West Haven	203-937-3577	abdul_quadir@cityofwesthaven.com	
Bill Richards	Deputy Emd	Milford	203-671-6661	wrichards@ci.milford.ct.us	
Chris Saley		Milford		csaley@ci.milford.ct.us	
Kurt Weiss		North Branford		townengineer@townofnorthbranfordct.com	
Kevin White		East Haven		eh.kwhite@gmail.com	
SCRCOG					
Carl Amento	Executive Director	South Central Regional Council of Governments		camento@scrcog.org	
Rebecca Andreucci	Regional Planner	South Central Regional Council of Governments		randreucci@scrcog.org	
Stephen Dudley	Deputy Director	South Central Regional Council of Governments		sdudley@scrcog.org	
Eugene Livshits	Senior Regional Planner	South Central Regional Council of Governments	(203) 466-8626	elivshits@scrcog.org	
Christopher Rappa	Transportation Planner	South Central Regional Council of Governments		cjrappa@scrcog.org	
Consulting Team					
Jamie Caplan	Principal	Jamie Caplan Consulting LLC	413-586-0867	Jamie@jamiecaplan.com	
David Murphy	Manager of Water Resources Planning	Milone & MacBroom	203-271-1773	davem@miloneandmacbroom.com	
Darrin Punchard	Principal	Punchard Consulting LLC	617-777-2001	Darrin@punchardconsulting.com	

Name	Title	Organization	Phone	E-Mail	Initials
Mark Austin	Town Engineer	Hamden	203-287-7040	MAUSTIN@Hamden.com	MA
Kelly Hammill	Office Mgr.	Woodbridge	203-389-3492	KHammill@woodbridgect.org	KH
George Gemelas	~~City Planner~~ City Planner	New Haven	—	cpinterns@newhavenct.gov	GG

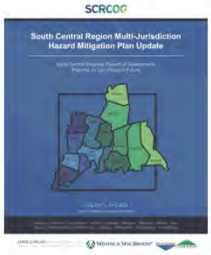
Advisory Committee Meeting 6/21/17

Advisory Committee Meeting
June 21, 2017

South Central Regional Multi-Jurisdiction
Hazard Mitigation Plan Update

AGENDA

- Introductions and Binders
- Project Introduction
- Planning Process in Detail
- Next Steps



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PROJECT TEAM

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PROJECT INTRODUCTION

- Update for FEMA compliance
  - Reflect current development
  - Changes in capability
  - Mitigation project implementation
  - Updated data
- Add 4 Municipalities
  1. East Haven
  2. Guilford
  3. Milford
  4. New Haven
- 14 Municipalities – 1 Plan

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MITIGATION AND MITIGATION PLANNING

Hazard Mitigation
Any action taken to reduce or eliminate long-term risk to life and property from hazards.

Mitigation Planning
- *Engage the community and key stakeholders*
- *Assess hazard risks and mitigation capabilities*
- *Identify mitigation actions that lead to long-term risk reduction*
- *Implement and maintain the plan*

- Hazard Mitigation Plans form the foundation for a community's long-term strategy to reduce disaster losses and break the cycle of disaster damage, reconstruction, and repeated damage. The planning process is as important as the plan itself. It creates a framework for risk-based decision making to reduce damages to lives, property, and the economy from future disasters.

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BENEFITS OF MITIGATION PLANNING

- Identify hazards and prioritize risk reduction efforts
- Increase public awareness of hazards
- Build partnerships between jurisdictions
- Align risk reduction with other community objectives
- Become eligible for State and Federal funding
- Speed recovery following disaster events
- Maximize credit points under the National Flood Insurance Program's Community Rating System (CRS)

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Advisory Committee Meeting 6/21/17

BENEFITS AND CHALLENGES OF PLAN UPDATE

- Regional plan achieves economies of scale.
- Including 14 municipality specifics is a challenge.
- Our solution
  - Confer with FEMA and CT Dept. of Emergency Services & Public Protection for their expectations.
  - Work with individual municipalities to gather data.
- Your thoughts…

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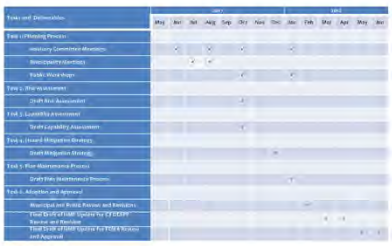
TIMELINE



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PLANNING PROCESS IN DETAIL

Key Project Tasks:

1. Planning Process
2. Risk Assessment
3. Capability Assessment
4. Hazard Mitigation Strategy
5. Plan Maintenance Process
6. Adoption and Approval

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ROLE OF THE ADVISORY COMMITTEE

- Help guide and inform plan development
- Attend 4 committee meetings
- Provide supporting data/information upon request
- Assist in the evaluation and prioritization of mitigation actions
- Review and comment on draft plan deliverables
- Approve final draft plan prior to submission to CT Dept. of Emergency Services & Public Protection and FEMA
- Public outreach and engagement – help spread the word!

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PUBLIC OUTREACH AND STAKEHOLDER ENGAGEMENT

- To generate public interest, solicit citizen input, and engage additional partners in the plan development process
  - Advisory Committee
  - Municipality Meetings
  - Public Outreach
    - Project Fact Sheet
    - Public Meetings
    - Public Opinion Survey
    - Media Releases
- Public outreach and stakeholder engagement is essential to project success!

Project Website http://scrcog.org/regional-planning/regional-hazard-mitigation/

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MUNICIPALITY MEETINGS PURPOSE

- Gather municipality specific data
  - Critical facility identification
  - Capability assessment information
  - New mitigation actions
- Advisory Committee member responsible for logistics

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South Central Regional Multi-Jurisdiction Hazard Mitigation Plan Update 2

Advisory Committee Meeting 6/21/17

PUBLIC MEETINGS

- Education
- Ground-truthing
- FEMA requirements
- Support for future mitigation actions

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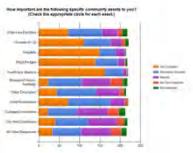
PUBLIC SURVEY



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RISK ASSESSMENT – 2014 APPROACH

- **Approach in the 2014 Plan**
  - Hazards were profiled from existing information, prior State hazard mitigation plan editions, and through workshops with the municipalities
  - HAZUS Version 2.1 (with 2000 Census data) was used to estimate losses for hurricane winds, floods, and earthquakes
  - National Climate Data Center (NCDC) database of events was used to estimate losses from other hazards such as severe thunderstorms and winter storms
  - Critical facilities, vulnerable populations, historic resources, and other community assets were described, mapped and included in the exposure analysis where possible
  - Specific "problem statements" were created for each jurisdiction
  - **All of this information is useful and provides the foundation for the update**

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RISK ASSESSMENT –ADDITIONAL ANALYSIS

- **Approach for Additional Analysis in Updated Plan**
- The list of hazards will be the same
- Hazard profiles will be similar but updated for new information
- This SCRCOG plan update will allow for the first time consideration of risk profiles and loss estimates in the Connecticut Hazard Mitigation Plan Update (2014), which was a significant update relative to the 2010 edition of the Connecticut Hazard Mitigation Plan
  - DEMSH will at the very least require consistency

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RISK ASSESSMENT – ADDITIONAL ANALYSIS

Approach for Additional Analysis in Updated Plan

- Consideration of changes associated with the new Flood Insurance Study (FIS) and FIRM for Quinnipiac River and south-central Connecticut

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RISK ASSESSMENT – HAZUS

- **Approach for Additional Analysis in Updated Plan**
  - –National Climate Data Center (NCDC) updated database of events
  - –Updated lists of Repetitive Loss (RL) and Severe Repetitive Loss (SRL) properties
  - –Consideration of the two disasters declared since the initial plan (2013 and 2015)
  - –HAZUS Version 4.0 with 2010 Census Data

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Advisory Committee Meeting 6/21/17

RISK ASSESSMENT – INCLUDING CURRENT PLANS

- Approach for Additional Analysis in Updated Plan
  - Climate Change Analysis results from State Water Plan (June 2017)
  - Sea level rise projections updated by NOAA (January 2017)
  - Narratives that describe specific coastal hazards in the following coastal resilience plans:
    - Guilford
    - Madison
    - Branford
    - Milford
    - West Haven

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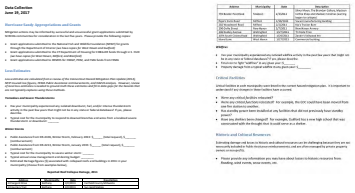
DATA COLLECTION WORKSHEET



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CAPABILITY ASSESSMENT

- Purpose: To assess each municipality's existing authorities, policies, programs, and resources available to support hazard mitigation efforts.
- Two primary components:
  - An inventory of municipality plans, regulations, programs, and activities already in place.
  - An analysis of each municipality's capacity and resources to carry them out, and it's ability to expand or enhance them for hazard mitigation purposes.
- Types of capabilities:
  - Planning and Regulatory
  - Administrative and Technical
  - Financial
  - Education and Outreach
  - National Flood Insurance Program and Community Rating System

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MITIGATION STRATEGY

- Long-term blueprint for reducing the potential losses identified in the risk assessment.
- The strategy describes how the municipalities will accomplish the overall mission of the mitigation plan.
- Mission Statement
  - Reduce or eliminate risk to people and property from natural hazards.

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2014 Mitigation Plan Goals

Goal Categories	Mitigation Plan Goals
Community Planning	1. Reduce the impact of natural hazards by integrating natural hazard mitigation policies and practices into local community planning.
Flood Hazards	2. Minimize flood hazards in the region by maintaining continued compliance with the National Flood Insurance Program, adopting higher regulatory standards for new floodplain development, and implementing flood mitigation projects for existing flood prone structures.
Trees	3. Limit the impact of fallen trees due to natural hazards by collaborating with electric utility companies and property owners (private and public) to cut limbs and remove hazardous trees that pose threats to buildings, infrastructure and utility lifelines.
Regional Collaboration	4. Build capacity for natural hazard mitigation and climate adaptation at the local level through regional collaboration.
Public Awareness and Preparedness	5. Increase public awareness and preparedness for natural hazards by implementing community-based public education programs across the region.

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WORK DONE TO DATE

- Mitigation plan worksheets and mitigation plan progress report.
- Collect a current update.
- Review other plans that identify mitigation actions.

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Advisory Committee Meeting 6/21/17

MITIGATION ACTIONS

1. Local Planning and Regulations
2. Structure and Infrastructure Projects
3. Natural Systems Protection
4. Education and Awareness Programs


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NEXT STEPS

- Municipality Meetings
  - Schedule
  - Outreach to potential participants
- Next Advisory Committee Meeting

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THANK YOU

- Jamie Caplan, Jamie Caplan Consulting, LLC
  - 413-586-0867
  - jamie@jamiecaplan.com
- David Murphy, Milone & MacBroom
  - 203-271-1773
  - davem@miloneandmacbroom.com
- Darrin Punchard, Punchard Consulting LLC
  - 617-777-2001
  - darrin@punchardconsulting.com

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South Central Regional Multi-Jurisdiction
Hazard Mitigation Plan Update 5

SEPTEMBER 14, 2017

SCRCOG
SOUTH CENTRAL REGIONAL COUNCIL OF GOVERNMENTS
Planning for Our Region's Future

Bethany Branford East Haven Guilford Hamden Madison Meriden Milford
New Haven North Branford North Haven Orange Wallingford West Haven Woodbridge

Carl J. Amento, Executive Director

South Central Regional Multi-Jurisdiction
Hazard Mitigation Plan Update

AGENDA
September 14, 2017
Advisory Committee Meeting

Project Status Update

Public Outreach and Stakeholder Engagement
- Public Meetings
- Survey

Capability Assessment
- Safe Growth Survey

Risk Assessment Update
- Problem Statements

Mitigation Strategy
- Mitigation Plan Goals
- Status – Previous Actions
- Incorporating Coastal Resilience Projects

Next Steps
- Public Meetings in each municipality
- Survey outreach
- November 16th 10:00 am Advisory Committee Meeting

For more information:
Eugene Livshits, Senior Regional Planner
203-466-8626
elivshits@scrcog.org
http://scrcog.org/regional-planning/regional-hazard-mitigation/

SCRCOG Mitigation Plan Advisory Committee

Meeting, September 14, 2017

Name	Title	Organization	Phone	E-Mail	Initials
David Anderson	Town Planner	Madison	203-245-5632	andersond@madisonct.org	DMA
Mark Austin	Town Engineer	Hamden	203-287-7040	maustin@hamden.com	
Jonathan Bodwell	Town Engineer	North Haven	203-239-5321 x430	bodwell.jonathan@town.north-haven.ct.us	JB
Warren Connors	Public Works Director	Woodbridge	203-389-3421	wconnors@woodbridgect.org	WC
Karyn Gilvarg	City Plan Department	New Haven	203-946-6379	kgilvarg@newhavenct.net	
George Gremelas	City Plan Department	New Haven		cpintern@newhavenct.gov	
Donna Hall	City Plan Department	New Haven	203-946-7842	dhall@newhavenct.net	
Kelly Hammill	Office Manager	Woodbridge	203-389-3492	khammill@woodbridgect.org	
Richard Heidgerd	Fire Chief	Wallingford	203-294-2730	rheidgerd@wallingfordfd.com	
Robert Hiza	Town Engineer	Orange	203-891-4741	rhiza@orange-ct.gov	
Clark Hurlburt	Deputy EMD/CERT coord.	Bethany		clarkhurlburt@sbcglobal.net	
Isabel Kearns	ZEO/ Land Use Admin	Bethany	203-393-2100 x135	IKearns@Bethany-ct.com	
Kevin Magee	Environmental Planner	Guilford	203-453-8074	mageek@ci.guilford.ct.us	
Matthew Marcarelli	Fire Chief	East Haven	203-468-3221	mmarcarelli@easthavenfire.com	
Meg McGaffin	GIS Analyst	Milford	203-701-7746	mmcgaffin@ci.milford.ct.us	
Michael Ott	Town Engineer/ DPW	Madison	203-245-5611	ottm@madisonct.org	
Fred Palmer	Director of Emergency Management	Orange	203-444-2733	fcpalmer@juno.com	
MaryRose Palumbo	Inland Wetland Agent	Milford	203-701-4452	mpalumbo@ci.milford.ct.us	
Janice Plaziak	Town Engineer	Branford	203-315-0606	jplaziak@branford-ct.gov	
James Portley	Town Engineer	Guilford	203-453-8037	portleyJ@ci.guilford.ct.us	
Abdul Quadir	Civil Engineer	West Haven	203-937-3577	abdul_quadir@cityofwesthaven.com	
Bill Richards	Deputy Emergency Management Director	Milford	203-671-6661	wrichards@ci.milford.ct.us	
Chris Saley	Public Works Director	Milford	203-783-3269	csaley@ci.milford.ct.us	
MATT DAVIS	Asst Planner	Hamden	203-287-7077	mdavis@hamden.com	
Andrew Kinlock	GIS Coord.	Hamden	203-287-7044	akinlock@hamden.com	

SCRCOG Mitigation Plan Advisory Committee

Meeting, September 14, 2017

Kurt Weiss	Town Engineer	North Branford	203-484-6009	townengineer@townofnorthbranfordct.com	KW
Kevin White	Town Engineer	East Haven	203-468-3250	eh.kwhite@gmail.com	
SCRCOG					
Carl Amento	Executive Director	South Central Regional Council of Governments	203-466-8625	camento@scrcog.org	
Rebecca Andreucci	Regional Planner	South Central Regional Council of Governments	203-466-8601	randreucci@scrcog.org	RA
Stephen Dudley	Deputy Director	South Central Regional Council of Governments	203-466-8624	sdudley@scrcog.org	
Eugene Livshits	Senior Regional Planner	South Central Regional Council of Governments	203-466-8626	elivshits@scrcog.org	✓
Christopher Rappa	Transportation Planner	South Central Regional Council of Governments	203-466-8610	cjrappa@scrcog.org	
Consulting Team					
Jamie Caplan	Principal	Jamie Caplan Consulting LLC	413-586-0867	Jamie@jamiecaplan.com	✓
David Murphy	Manager of Water Resources Planning	Milone & MacBroom	203-271-1773	davem@miloneandmacbroom.com	✓
Darrin Punchard	Principal	Punchard Consulting LLC	617-777-2001	Darrin@punchardconsulting.com	✓

Advisory Committee Meeting 9/14/17

Advisory Committee Meeting
September 14, 2017

South Central Regional Multi-Jurisdiction Hazard Mitigation Plan Update

AGENDA

1. Project Status Update
2. Public Outreach
3. Capability Assessment
4. Risk Assessment
5. Mitigation Plan Goals
6. Mitigation Strategy
7. Next Steps

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TIMELINE

Tasks and Deliverables	2017								2018					
	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun
Task 1. Planning Process														
Advisory Committee Meetings		✓		✓		✓			✓					
Municipality Meetings			✓	✓										
Public Workshops						✓			✓					
Task 2. Risk Assessment														
Draft Risk Assessment						✓								
Task 3. Capability Assessment														
Draft Capability Assessment						✓								
Task 4. Hazard Mitigation Strategy														
Draft Mitigation Strategy								✓						
Task 5. Plan Maintenance Process														
Draft Plan Maintenance Process									✓					
Task 6. Adoption and Approval														
Municipal and Public Review and Revisions										✓				
Final Draft of HMP Update for CT DESPP Review and Revision											✓	✓		
Final Draft of HMP Update for FEMA Review and Approval													✓	✓

JAMIE CAPLAN CONSULTING LLC

MUNICIPALITY MEETINGS

JAMIE CAPLAN CONSULTING LLC

PUBLIC MEETINGS

Invite neighbors

- Shelton
- Stratford
- Ansonia
- Delray
- Seymour
- Beacon Falls
- Cheshire
- Durham
- Meriden
- Killingsworth
- Clinton

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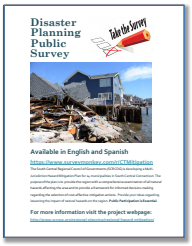
PUBLIC SURVEY

- Flyer and Press Release available
- Review link at end of survey
- English: https://www.surveymonkey.com/r/CTMitigation
- Spanish: https://es.surveymonkey.com/r/CTMitigationSpanish



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Advisory Committee Meeting 9/14/17

CAPABILITY ASSESSMENT

Types of capabilities

- Planning and Regulatory
- Administrative and Technical
- Financial
- Education and Outreach
- National Flood Insurance Program and Community Rating System

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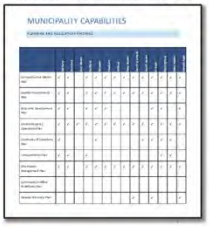
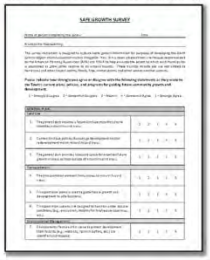
MUNICIPALITY CAPABILITIES

Review Capabilities Report



Complete Safe Growth Survey



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RISK ASSESSMENT UPDATE

- **HAZUS Analysis** for Flood, Hurricane Winds, and Earthquake
  - Flood Analysis mostly complete
  - Hurricane Wind Analysis mostly complete
  - Earthquake Analysis on hold for Connecticut HMP Update Coordination
- **Loss Estimates**
  - Loss estimates completed based on the 2014 Connecticut HMP
  - Additional loss estimate figures received from Wallingford, West Haven, Milford, and North Haven
- **NCDC Database Review**

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RISK ASSESSMENT UPDATE

- **Repetitive Loss Properties**

Town	Number of Properties
Bethany	0
Branford	127
East Haven	243
Guilford	65
Hamden	47
Madison	87
Milford	561
New Haven	43
North Branford	9
North Haven	19
Orange	17
Wallingford	11
West Haven	84
Woodbridge	5

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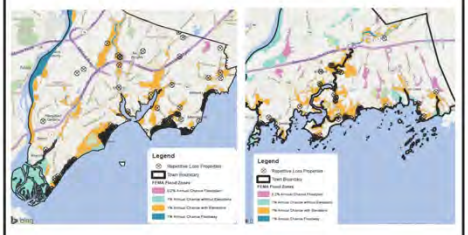
RISK ASSESSMENT UPDATE



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RISK ASSESSMENT UPDATE

- **Dams**

Town	Class B	Class C
Bethany	3	2
Branford	4	1
East Haven	0	1
Guilford	3	2
Hamden	3	5
Madison	1	1
Milford	2	0
New Haven	1	0
North Branford	1	3
North Haven	0	0
Orange	3	0
Wallingford	3	8
West Haven	1	4
Woodbridge	0	3

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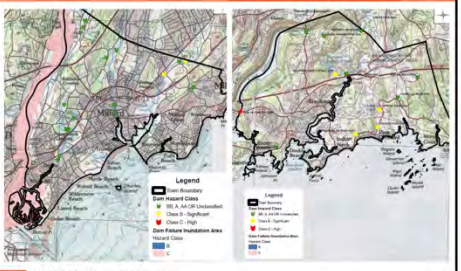
RISK ASSESSMENT UPDATE



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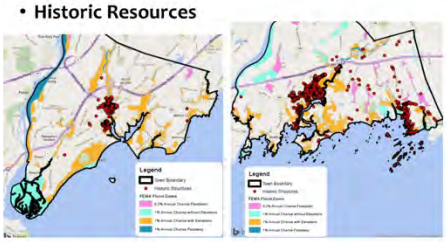
RISK ASSESSMENT UPDATE

- **Historic Resources**



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RISK ASSESSMENT UPDATE

- **Critical Facilities**
  - Detailed lists available from the four individual approved HMPs that are being incorporated into the multi-jurisdiction HMP, and the individual Wallingford HMP
  - Will need to work with the remaining nine municipalities to develop lists
  - The lists provided to Eversource and UI can be used

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PROBLEM STATEMENTS UPDATE

- Primary Hazards of Concern
- Geographic Areas of Concern
- Vulnerable Community Assets
- Changes/Improvements Since 2014

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MITIGATION STRATEGY

Mission Statement

Reduce or eliminate risk to people and property from natural hazards.

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2014 MITIGATION PLAN GOALS

Goal Categories	Mitigation Plan Goals
Community Planning	1. Reduce the impact of natural hazards by integrating natural hazard mitigation policies and practices into local community planning.
Flood Hazards	2. Minimize flood hazards in the region by maintaining continued compliance with the National Flood Insurance Program, adopting higher regulatory standards for new floodplain development, and implementing flood mitigation projects for existing flood prone structures.
Trees	3. Limit the impact of fallen trees due to natural hazards by collaborating with electric utility companies and property owners (private and public) to cut limbs and remove hazardous trees that pose threats to buildings, infrastructure and utility lifelines.
Regional Collaboration	4. Build capacity for natural hazard mitigation and climate adaptation at the local level through regional collaboration.
Public Awareness and Preparedness	5. Increase public awareness and preparedness for natural hazards by implementing community-based public education programs across the region.

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2014 MITIGATION PLAN GOALS

Any changes?

Consider:

- Lessons learned since 2014
- Updated risk assessment findings
- Changes in priorities or other regional goals
- State hazard mitigation goals (reaffirmed in 2014)

1. Promote implementation of sound floodplain management and other natural hazard mitigation principles on a state and local level.
2. Implementation of effective natural hazard mitigation projects on a state and local level.
3. Increase research and planning activities for the mitigation of natural hazards on a state and local level.

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MITIGATION TRACKER

Purpose

Document the current status and progress in implementing previous mitigation actions/projects

- Excel-based worksheets created for each jurisdiction
- Requires additional input from local POCs:
  - **Current Status** *(drop-down menu)*
  - **Current Status Description/Explanation**
  - **Keep for Updated Plan?** *(drop-down menu)*
  - **Updated Action Title/Description**

Element D2

MITIGATION TRACKER

Demo

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INCORPORATING COASTAL RESILIENCE PLANS/PROJECTS

- Aiming for ***consistency*** between plans, which should be ***mutually supportive***
- Need to keep things ***manageable*** for Regional HMP purposes
- Proposed approach:
  - include primary conceptual designs from Regional Framework
  - Include select projects (or project groupings) as needed
  - include ALL projects in appendix

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INCORPORATING COASTAL RESILIENCE PLANS/PROJECTS

- **Guilford**
  - Mainly policy document without specific mitigation actions
  - Chittenden Beach erosion mitigation/living shoreline was carried to design in the Regional Framework for Coastal Resilience and will be a mitigation action in the HMP
- **Branford, Madison, Milford, and West Haven**
  - CRP Tracker worksheets have been prepared
  - Consultant team has filled in some status statements based on local knowledge and working with the municipalities
  - Additional work is needed
- Examples of suggested mitigation actions:
  - Guilford: Chittenden Beach erosion mitigation/living shoreline
  - Branford: Meadow Street flood barrier/gate
  - Madison: Middle Beach Road protection
  - Milford: Execute Walnut/Wildemere Beach nourishment + dune ridge creation
  - West Haven: Design and permitting of the outfall replacement

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REGIONAL FRAMEWORK FOR COASTAL RESILIENCE

- 100+ individual projects were catalogued
- Many have risk reduction benefits

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INCORPORATING COASTAL RESILIENCE PLANS/PROJECTS

Town	Primary Conceptual Design from RFCR	Was it in the HMP and/or CRP?	Secondary Concept from RFCR	Was it in the HMP and/or CRP?	To be included as Mitigation Action in HMP Update
Milford	Stream daylighting at Community Ctr.	No	–	–	Stream daylighting at Community Ctr.
West Haven	Beach nourishment and dune ridge	Yes	Floodplain enhancement	No	Beach nourishment and dune ridge
New Haven	Living shoreline at Long Wharf	Yes	–	–	Living shoreline at Long Wharf
East Haven	Road elevation/ abandonment	Yes	Dune enhancement at Town Beach	No	Road elevation/ abandonment
Branford	Living shoreline for pedestrian bridge abutments	Yes	Living shoreline and offshore breakwaters at Shore Road	No	Living shoreline for pedestrian bridge abutments
Guilford	Chittenden Beach living shoreline	Yes	–	–	Chittenden Beach living shoreline
Madison	Surf Club dune restoration	Yes	–	–	Surf Club dune restoration

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MITIGATION ACTION UPDATE

New Haven Port

- Major petroleum (regional) port in northeast, second largest in New England, located on New Haven Harbor with immediate access to I-91.
- Approximately 400,000 square feet of inside storage; approximately 50 acres of outside storage space available.
- Residual oil, distillate oil, and gas tanks are stored in nearly 200 tanks (with a total storage of at least 10 million barrels) by the water posing high risk for contamination or fire in the event of a natural disaster.

Recommendations to reduce the risk:

- Promoting energy efficiency through reduced consumption,
- Relocate tanks to other sites internally (consistent with Long Island Sound study recommendations)
- Stringent land use regulations limiting expansion or new storage tanks
- Creative financing strategies for acquisition and relocation.

See https://www.gpo.gov/fdsys/pkg/CZIC-td692-5-p48-1980/html/CZIC-td692-5-p48-1980.htm

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NEXT STEPS

- Public Meetings
  - Schedule this fall!
- Survey Outreach

- To Review
  1. Safe Growth Survey
  2. Problem Statements
  3. Capability Assessment Tables
  4. Old Mitigation Actions
- Next Advisory Committee Meeting
  – November 16th 10:00 am

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THANK YOU

- **Jamie Caplan,** Jamie Caplan Consulting, LLC
  - 413-586-0867
  - jamie@jamiecaplan.com
- **David Murphy,** Milone & MacBroom
  - 203-271-1773
  - davem@miloneandmacbroom.com
- **Darrin Punchard,** Punchard Consulting LLC
  - 617-777-2001
  - darrin@punchardconsulting.com

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NOVEMBER 16, 2017

SCRCOG
SOUTH CENTRAL REGIONAL COUNCIL OF GOVERNMENTS
Planning for Our Region's Future

Bethany Branford East Haven Guilford Hamden Madison Meriden Milford
New Haven North Branford North Haven Orange Wallingford West Haven Woodbridge

Carl J. Amento, Executive Director

South Central Regional Multi-Jurisdiction
Hazard Mitigation Plan Update

AGENDA
November 16, 2017
Advisory Committee Meeting

Project Status Update

Planning Process and Public Outreach

Capability Assessment

Risk Assessment Update

Mitigation Strategy
- Distribute Problem Statements
- Status – Previous Actions
- New Mitigation Actions

Next Steps
- New Mitigation Actions
- Public Meetings in each Municipality
- Survey outreach
- February 8th 10:00 am Advisory Committee Meeting

For more information:
Eugene Livshits, Senior Regional Planner
203-466-8626
elivshits@scrcog.org
http://scrcog.org/regional-planning/regional-hazard-mitigation/

SCRCOG Mitigation Plan Advisory Committee Meeting, November 16, 2017

Name	Title	Organization	Phone	E-Mail	Initials
Clark Hurlburt	Deputy EMD/CERT coord.	Bethany		clarkhurlburt@sbcglobal.net	CDH
Isabel Kearns	ZEO/ Land Use Admin	Bethany	203-393-2100 x135	IKearns@Bethany-ct.com	
Janice Plaziak	Town Engineer	Branford	203-315-0606	jplaziak@branford-ct.gov	
Matthew Marcarelli	Fire Chief	East Haven	203-468-3221	mmarcarelli@easthavenfire.com	
Kevin White	Town Engineer	East Haven	203-468-3250	eh.kwhite@gmail.com	
Kevin Magee	Environmental Planner	Guilford	203-453-8074	mageek@ci.guilford.ct.us	
James Portley	Town Engineer	Guilford	203-453-8037	portleyJ@ci.guilford.ct.us	
Mark Austin	Town Engineer	Hamden	203-287-7040	maustin@hamden.com	
Matt Davis	Assistant Planner	Hamden	(203) 287-7077	mdavis@hamden.com	
Andrew Kinlock	GIS Coordinator	Hamden	(203) 287-7049	akinlock@hamden.com	
Jamie Caplan	Principal	Jamie Caplan Consulting LLC	413-586-0867	Jamie@jamiecaplan.com	
David Anderson	Town Planner	Madison	203-245-5632	andersond@madisonct.org	
Michael Ott	Town Engineer/ DPW	Madison	203-245-5611	ottm@madisonct.org	
Meg McGaffin	GIS Analyst	Milford	203-701-7746	mmcgaffin@ci.milford.ct.us	
MaryRose Palumbo	Inland Wetland Agent	Milford	203-701-4452	mpalumbo@ci.milford.ct.us	
Bill Richards	Deputy Emergency Management Director	Milford	203-671-6661	wrichards@ci.milford.ct.us	
Chris Saley	Public Works Director	Milford	203-783-3269	csaley@ci.milford.ct.us	
David Murphy	Manager of Water Resources Planning	Milone & MacBroom	203-271-1773	davem@miloneandmacbroom.com	DM
Karyn Gilvarg	City Plan Department	New Haven	203-946-6379	kgilvarg@newhavenct.net	
George Gremelas	City Plan Department	New Haven		cpintern@newhavenct.gov	
Donna Hall	City Plan Department	New Haven	203-946-7842	dhall@newhavenct.net	
Kurt Weiss	Town Engineer	North Branford	203-484-6009	townengineer@townofnorthbranfordct.com	
Jonathan Bodwell	Town Engineer	North Haven	203-239-5321 x430	bodwell.jonathan@town.north-haven.ct.us	JB

Dan Kops Town Planner Hamden 203-287-7070 dkops@hamden.com
Noah Stavin Env. Scientist MMI 203 271-1773 noahs@miloneandmacbroom.com NS

SCRCOG Mitigation Plan Advisory Committee Meeting, November 16, 2017

Robert Hiza	Town Engineer	Orange	203-891-4741	rhiza@orange-ct.gov	
Fred Palmer	Director of Emergency Management	Orange	203-444-2733	fredpalmer63@gmail.com	
Mary Shaw	Administrative Assistant to First Selectman	Orange		mshaw@orange-ct.gov	
James Zeoli	First Selectman	Orange		jzeoli@orange-ct.gov	
Darrin Punchard	Principal	Punchard Consulting LLC	617-777-2001	Darrin@punchardconsulting.com	
Carl Amento	Executive Director	South Central Regional Council of Governments	203-466-8625	camento@scrcog.org	
Rebecca Andreucci	Regional Planner	South Central Regional Council of Governments	203-466-8601	randreucci@scrcog.org	RA
Stephen Dudley	Deputy Director	South Central Regional Council of Governments	203-466-8624	sdudley@scrcog.org	
Eugene Livshits	Senior Regional Planner	South Central Regional Council of Governments	203-466-8626	elivshits@scrcog.org	
Christopher Rappa	Transportation Planner	South Central Regional Council of Governments	203-466-8610	cirappa@scrcog.org	
JOE CZENTNAR Richard Heidgerd	Deputy Fire Chief	Wallingford	203-294-2730	jczentnar rheidgerd@wallingfordfd.com	
Abdul Quadir	Civil Engineer	West Haven	203-937-3577	abdul_quadir@cityofwesthaven.com	
Warren Connors	Public Works Director	Woodbridge	203-389-3421	wconnors@woodbridgect.org	
Kelly Hammill	Office Manager	Woodbridge	203-389-3492	akinlock@hamden.com	

Advisory Committee Meeting 9/14/17

Advisory Committee Meeting
November 16, 2017

South Central Regional Multi-Jurisdiction Hazard Mitigation Plan Update

AGENDA

1. Project Status Update
2. Planning Process and Public Outreach
3. Capability Assessment
4. Risk Assessment
5. Mitigation Strategy
6. Next Steps

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TIMELINE

Tasks and Deliverables	2017							2018					
	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun
Task 1. Planning Process														
Advisory Committee Meetings		✓		✓		✓			✓					
Municipality Meetings			✓	✓										
Public Workshops						✓			✓					
Task 2. Risk Assessment														
Draft Risk Assessment						✓								
Task 3. Capability Assessment														
Draft Capability Assessment						✓								
Task 4. Hazard Mitigation Strategy														
Draft Mitigation Strategy								✓						
Task 5. Plan Maintenance Process														
Draft Plan Maintenance Process									✓					
Task 6. Adoption and Approval														
Municipal and Public Review and Revisions										✓				
Final Draft of HMP Update for CT DESPP Review and Revisions											✓	✓		
Final Draft of HMP Update for FEMA Review and Approval													✓	✓

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PLANNING PROCESS

Risk Assessment + Capability Assessment → Problem Statements → Mitigation Actions

- Advisory Committee Feedback
  - Critical Facility List
  - Problem Statements
  - Safe Growth Survey
  - Capabilities Tables
  - Mitigation Action Tracker
    - Coastal Resilience Tracker

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PUBLIC OUTREACH/MEETINGS

- Prepare Meeting
  - Schedule
  - Customize PowerPoint
  - Conduct Outreach
- Post Meeting – Send to Jamie
  - Sign-in Sheets
  - List of places posted flyer or sent press release
  - Meeting feedback or ideas captured

Regional Public Meetings

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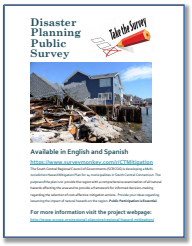
PUBLIC SURVEY

- Flyer and Press Release available
- English: https://www.surveymonkey.com/r/CTMitigation
- Spanish: https://es.surveymonkey.com/r/CTMitigationSpanish
- 39 Responses to date – work on getting the word out!


Disaster Planning Public Survey

Take the Survey

Available in English and Spanish

https://www.surveymonkey.com/r/CTMitigation

For more information visit the project webpage:

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Advisory Committee Meeting 9/14/17

CAPABILITY ASSESSMENT - UPDATES

- Planning and Regulatory
- Administrative and Technical
- Financial
- Education and Outreach
- National Flood Insurance Program and Community Rating System

Jurisdiction	NFIP Entry Date	Current Effective Map	Number of Policies 2013	Number of Policies 9/30/2017	Amount of Premiums 2017	Amount of Coverage 2014	Amount of Coverage 2017	Amount of Change in Coverage from 2014-2017
Bethany	8/23/77	12/17/10	7	7	$5,353.00	$2,235,900.00	$2,018,800.00	$(217,100.00)
Branford	12/15/77	12/17/10	1,168	1,273	$1,836,553.00	$259,980,300.00	$308,115,400.00	$48,135,100.00
East Haven	6/18/74	5/16/17		1,083	$1,479,664.00		$253,088,100.00	$253,088,100.00
Guilford	8/1/74	5/16/17		677	$924,158.00		$171,411,800.00	$171,411,800.00
Hamden	6/15/79	12/17/10	296	206	$363,187.00	$67,234,100.00	$64,918,200.00	$(2,316,900.00)
Madison	9/15/78	12/17/10	545	584	$1,097,166.00	$157,516,600.00	$171,661,400.00	$14,144,800.00
Milford	10/18/74	5/16/17		7,069	$3,137,615.00		$698,475,700.00	$698,475,700.00
New Haven	6/7/74	5/16/17		956	$1,407,429.00		$230,764,800.00	$230,764,800.00
North Branford	7/3/78	12/17/10	100	116	$118,266.00	$23,979,800.00	$26,981,900.00	$3,002,100.00
North Haven	9/17/80	12/17/10	133	190	$170,915.00	$38,762,200.00	$42,695,900.00	$3,933,700.00
Orange	3/18/80	12/17/10	75	70	$73,788.00	$19,861,200.00	$19,178,200.00	$(683,000.00)
Wallingford	9/15/78	12/17/10	234	137	$208,899.00	$53,022,500.00	$37,048,200.00	$(15,974,300.00)
West Haven	1/17/79	12/17/10	1,047	1,023	$1,303,195.00	$185,881,200.00	$216,081,500.00	$30,200,300.00
Woodbridge	3/16/81	12/17/10	74	51	$40,807.00	$20,160,300.00	$14,764,500.00	$(5,395,800.00)
Total			3,679	9,237	$11,987,055.00	$824,134,100.00	$2,257,107,800.00	$1,432,973,700.00

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RESULTS OF RISK ASSESSMENT UPDATE

HAZUS Flood For Coastal Municipalities

- Previous evaluation treated VE as coastal flood risk and all A zones as inland flood risk
- Current evaluation separates true coastal flooding (storm surge) from inland flooding (riverine)
- Census 2010 and revised FIRMs in the current HAZUS
- Result in coastal towns is a shift in damage figures, with a decrease in inland flood damage figures and an increase in coastal flood damage figures
- Example from Branford:
  - HAZUS 2013: $14M for 1% coastal flood event
  - HAZUS 2017: $396M for 1% coastal flood event
  - By comparison, PA for Hurricane Sandy was $1.5M, and the annualized NFIP flood loss is $318,000

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HAZUS Flood For Non-Coastal Municipalities

- Census 2010 and revised FIRMs in the current HAZUS
- Damage figures are typically lower than they were in the previous plan
- This could be a result of the distribution of population in the current version of HAZUS, and the revised Quinnipiac River FIRM
- Difficult to compare to actual flood losses, since the region did not flood badly in 1999 (Floyd), 2007, 2010, and 2011 (Irene/Lee) when other parts of the state experienced inland flooding

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HAZUS HURRICANE WIND

- Damage figures are typically lower than they were in the previous plan
- Uncertain why the damage figures have decreased
- Comparison to actual hurricane losses / Branford example:
  - PA for Hurricane Sandy = $727,000
  - 10-year RI hurricane = $0
  - 20-year RI hurricane = $805,720

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HAZUS EARTHQUAKE

- Damage figures are universally higher than they were in the previous plan
- This is a result of the revised approach
  - We simulated the Moodus earthquake to be consistent with the Connecticut Hazard Mitigation Plan (2014)
- Most of the results are reasonable, except that some of the water, sewer, and gas utility losses are likely overestimated in the towns that lack these utilities

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Advisory Committee Meeting 9/14/17

SEA LEVEL RISE

- Previous HMP used mapping prepared by TNC in its Coastal Resilience Tool for the 2080s high scenario (three feet)
- Current HMP uses the "official" projections supported by CIRCA that will be adopted for statewide planning (50 cm by 2050, or 20 inches)
- The result is a revised count of buildings and population at risk

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COASTAL EROSION

- Previous HMP was not able to characterize erosion because the State data was not yet available
- Current HMP uses the CT Shoreline Change atlas, report, and GIS data that were published in mid-2014
- The result is a new count of buildings and population at risk

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WILDLAND FIRES AND WILDFIRES

- Previous HMP used mapping prepared by the SILVIS lab
- Current HMP uses polygons developed by subtracting areas with fire protection, significant potential fire protection, and dense urban areas. A 50 foot buffer was then added to the resulting layer in order to simulate the urban-wildland interface.
- The result is a revised count of buildings and population at risk

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15

HAZARDS FOR WHICH METHODS WERE NOT CHANGED

- Thunderstorms, tornadoes
- Severe winter storms
- Droughts
- Extreme temperatures
- In most cases, building and population counts are similar or the same
- Loss estimates are different because the Connecticut Hazard Mitigation Plan Update (2014) was used

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HISTORIC RESOURCES

- This is the first SCRCOG plan to use the new spatial data developed by SHPO using Hurricane Sandy funds
- Numerous historic resources are located in many of the areas of risk
- To estimate the value of historic resources at risk, we assumed $500,000 per resource; the actual value could range from $100,000 for a modest building to well over $1M for a large facility

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CRITICAL FACILITIES

- This edition of the HMP lists and maps the locations of geo-located critical facilities using addresses provided by the municipalities,
- Previous plan appeared to use some HAZUS defaults
- Still waiting for a few towns to provide lists
- Consider some critical facilities to be of regional importance

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Advisory Committee Meeting 9/14/17

DAMS

- This edition of the HMP focuses on the dams in the region plus those upstream in the Quinnipiac River basin
- The previous HMP focused on dams in the region plus those located within a mile of the region
- Both HMPs focus on the Class B and C dams (high and significant hazard)
- Opportunities for multi-town collaboration

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REGIONAL ISSUES RAISED BY THE RISK ASSESSMENT

- COMMON ISSUES: *Issues that are shared by all, but do not need to be addressed regionally. Examples:*
  - Inland Flooding – too many specifics in each community, and major flood control projects are not on the horizon
  - Coastal Flooding – too many specifics in each community, and each community has identified what works best for them (elevations vs. buyouts)
  - Critical Facilities – likely need to be addressed on a case by case basis by the communities that support them
  - Dams – even when two or more communities are affected, the dam owner must work directly with affected communities
  - Trees and Power Outages – every community faces this, although there are opportunities for working with utilities that serve multiple municipalities ***(see the next slide)***
  - Sea Level Rise – communities are beginning to develop their own visions, and this is OK ***(see the next slide)***

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REGIONAL ISSUES RAISED BY THE RISK ASSESSMENT

- REGIONAL ISSUES: Issues that are shared by all, and could be addressed regionally. Examples:
  - Sea Level Rise – communities are beginning to develop their own visions, but CIRCA will be developing a statewide coastal resilience plan that focuses on patterns of TOD, redevelopment, and safe evacuation routes; some coordination is needed
  - Historic Resources – all communities have them; SHPO is concerned with them all but is capable of viewing values from a high level; mitigation actions should take this into account
  - Sewer Pumping Stations – GNHWPCA serves several communities
  - Water Utilities – South Central Regional Water Authority (RWA) serves several communities
  - Power Utilities – UI and Eversource serve multiple communities
  - Significant assets such as Tweed New Haven airport – the East Haven HMP and the New Haven HMP addressed it separately

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MITIGATION GOALS

Goal Categories	Mitigation Plan Goals
Community Planning	1. Reduce the impact of natural hazards by integrating natural hazard mitigation policies and practices into local community planning.
Flood Hazards	2. Minimize flood hazards in the region by maintaining continued compliance with the National Flood Insurance Program, adopting higher regulatory standards for new floodplain development, and implementing flood mitigation projects for existing flood prone structures.
Trees	3. Limit the impact of fallen trees due to natural hazards by collaborating with electric utility companies and property owners (private and public) to cut limits and remove hazardous trees that pose threats to buildings, infrastructure and utility lifelines.
Regional Collaboration	4. Build capacity for natural hazard mitigation and climate adaptation at the local level through regional collaboration.
Public Awareness and Preparedness	5. Increase public awareness and preparedness for natural hazards by implementing community-based public education programs across the region.

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PROBLEM STATEMENTS

- Primary Hazards of Concern
- Geographic Areas of Concern
- Vulnerable Community Assets
- Changes/Improvements since 2014

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MITIGATION ACTION TRACKER (previous actions)

- Updated with best available information
- Additional inputs still required for most jurisdictions

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Advisory Committee Meeting 9/14/17

NEW MITIGATION ACTIONS

Action Categories:

- Local Plans & Regulations
- Structure & Infrastructure Projects
- Natural Systems Protection
- Education & Awareness Programs
- Emergency Preparedness

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NEW MITIGATION ACTIONS

Local Plans & Regulations

Government authorities, policies, or codes that influence the way land and buildings are developed and built.

- Floodplain regulations
- Coastal setbacks/erosion regulations
- Master plans
- Land use ordinances
- Subdivision regulations
- Development review
- Building codes and enforcement
- Capital improvement programs
- Open space preservation
- Stormwater management regulations

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NEW MITIGATION ACTIONS

Local Plans & Regulations

Example:
Town of Bethany
Hazard Tree Management

In coordination with private utility operators, develop and adopt an ordinance to require the routine inspection, maintenance and removal (if necessary) of hazardous trees along public rights of way which pose potential threats to power distribution lines.

Current Status	Current Status Description/Explanation	Keep for Updated Plan?	Updated Action Title/Description (if applicable)
Partially Completed / In Progress	This project is underway but due to the extreme number of affected trees it is anticipated that this project will take several years more to accomplish than originally predicted. Due to need this project has developed into much more than development of an ordinance. Insect infestation has resulted in the need to begin an aggressive tree removal program. The Tree Warden has worked with representatives of the various utility companies in order to identify the trees needed for the most urgent removal located within the jurisdictional sphere of influence. Town funding of $50,000 in the FY 2015/2016 capital budget was set aside for this purpose. The removal program was started in July of 2015 and is ongoing.	YES - updated/revised description provided at right, if applicable	Continue the Town's aggressive tree removal program in coordination with local utility companies to identify and prioritize trees for the most urgent removal. Funding this at $100,000 from operating budget.

NEW MITIGATION ACTIONS

Structure & Infrastructure Projects

Modifying existing structures and infrastructure to protect them from a hazard or remove them from a hazard area. Also involves constructing new manmade structures to reduce hazard risks.

- Acquisitions and elevations of structures in flood prone areas
- Utility undergrounding
- Structural retrofits and upgrades
- Seawalls, floodwalls, and retaining walls
- Detention and retention structures
- Storm drain improvements, culverts, and channel modifications

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NEW MITIGATION ACTIONS

Structure & Infrastructure Projects

Example:
Town of Woodbridge
Merritt Avenue Bridge Replacement

Involves structure replacement to eliminate risk of deck closure due to scour potential during high water flow. It also eliminates a center pier that creates water flow restriction and debris collection.

Project completed in 2015

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NEW MITIGATION ACTIONS

Natural Systems Protection

Actions that minimize damage and losses and also preserve or restore the functions of natural systems.

- Dune and coastal barrier protection
- Sediment and erosion control
- Stream corridor restoration
- Forest management
- Conservation easements
- Wetland restoration and preservation
- Natural area and functions protection

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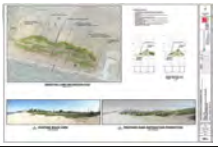
NEW MITIGATION ACTIONS

Natural Systems Protection

Example:
Town of Madison
Surf Club Dune Restoration
Restoration of coastal dune at Surf Club Recreation Facility. (Town-owned property that was damaged in Irene and Sandy)

Incorporated into Regional Framework for Coastal Resilience

Conceptual design/30% design has been completed.



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NEW MITIGATION ACTIONS

Education & Awareness Programs
Actions to inform and educate citizens, elected officials, and property owners about hazards and potential ways to mitigate them.

- Radio or television spots
- Library collections and websites with hazard maps and information
- Real estate disclosure
- Technical assistance on hazard mitigation
- Presentations to school groups or neighborhood organizations
- Mailings to residents in hazard-prone areas
- Participation in national risk awareness or emergency preparedness programs

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NEW MITIGATION ACTIONS

Education & Awareness Programs

Example:
Town of Wallingford
Emergency Preparedness Webpage
Create webpage for emergency preparedness on Town Website. Include information on preparation, and keeping debris from small streams to prevent street flooding.

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NEW MITIGATION ACTIONS

Education & Awareness Programs

Example:
City of New Haven
Implementation of CRS Program for Public Information (PPI)
The City Plan Department must ensure that the City Plan Commission (acting as the PPI Committee) makes progress in the many action items in the PPI.

Updated Action Title/Description (if applicable)
City distributed 13,500 copies of flood information brochures via residential property tax bills and also made these brochures available on the city website, main branch of local library, and at various City departments. Three public presentations were made in coastal areas of the city i.e., East Shore, Quinnipiac East, and Mill River. A news article on flood preparation was also released in July 2017 with links to flood information brochure and other materials available on the City Plan webpage.

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NEW MITIGATION ACTIONS

Emergency Preparedness *("non-mitigation actions")*

- Hazard warning systems
- Backup power generation and supply (e.g., generators)
- Disaster response planning and operations (including evacuation, sheltering, debris management, etc.)
- Continuity of Government/Operations Plans
- Health and safety maintenance
- Post-disaster recovery and redevelopment policies, plans, etc.

Tip from FEMA Region 1:
Present and identify non-mitigation actions within a separate section or table of the mitigation plan. Irrespective of inclusion, such items are not accepted as mitigation actions by FEMA but are understood to be important to some communities for inclusion.

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NEW MITIGATION ACTIONS

Discussion / Brainstorming

- *Any questions?*
- *Other local examples or mitigation ideas to share?*
- Review + discuss current Problem Statements
  - *What type of mitigation activities should be considered?*
  - *What additional information is needed?*
  - *Who else must be consulted?*
- Regional mitigation actions

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Advisory Committee Meeting 9/14/17

REGIONAL MITIGATION ACTIONS (DISCUSSION)

- Greater New Haven WPCA
- South Central Regional Water Authority (RWA)
- Port of New Haven
- Long Wharf
- Metro North and Amtrak lines
- Tweed New Haven Airport
- Beaches of Significant Regional Importance:
  - Hammonasset Beach
  - West Haven Beach/Savin Rock Beach
- Historic Resources – ***actions that SHPO can or should take to benefit all towns***

SCRCOG
Mission Statement
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NEW MITIGATION ACTIONS

- Updated *Mitigation Action Tracker* can be used to capture NEW mitigation actions
- Required information:
  - Action title
  - Action description
  - Estimated Cost
  - Potential Funding Source
  - Lead Department
  - Implementation Schedule
  - Priority

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PRIORITIZING MITIGATION ACTIONS

Recommended Criteria:

1. The extent to which benefits are maximized according to a general benefit/cost review
   - Benefits = risk reduction + other possible community benefits
   - Costs = estimated project cost ($$), staff time, etc.
2. Ease of implementation
   - Adequate capability
   - Political and community support
   - Funding availability

High Priority	The most immediate, cost-effective and appropriate actions preferably to be accomplished in the short to mid-term (1-2 year) planning horizon.
Moderate Priority	Fairly urgent, cost-effective and appropriate actions but with some possible difficulties associated with implementation. Preferably accomplished in the mid to long-term (2-4 year) planning horizon.
Low Priority	Not urgent, but an action to be considered for implementation over the long-term (4+ years) when implementation is deemed most appropriate.

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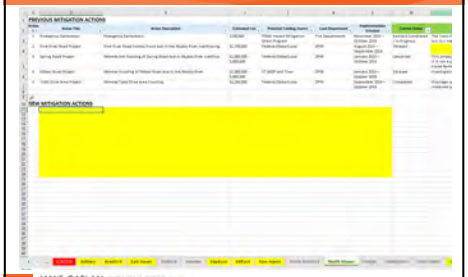
MITIGATION ACTION TRACKER (new actions)



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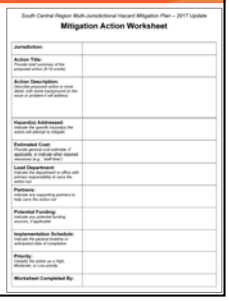
MITIGATION ACTION WORKSHEET

- Additional tool for capturing new mitigation actions
- Can be made available in digital (Word) and hard copy format


South Central Region Multi-Jurisdictional Hazard Mitigation Plan – 2017 Update
Mitigation Action Worksheet

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NEXT STEPS

- In coordination with other local staff, identify and propose new mitigation actions to include in your plan
  - Consider updated risk assessment info, problem statements, and other resources provided (e.g., FEMA "Mitigation Ideas" guidebook)
- Enter required info into the *Mitigation Action Tracker*
- Please reach out to Darrin for assistance!

P: 617-777-2001
E: darrin@punchardconsulting.com

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Advisory Committee Meeting 9/14/17

NEXT STEPS

- Public Meetings
  - Schedule this fall – before Christmas!
- Survey Outreach

- Next Advisory Committee Meeting
  - February 8th - 10:00 am
- New Mitigation Actions
- Review Draft Documents
  - Planning Area Profile
  - Capability Assessment
  - Risk Assessment

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THANK YOU

- **Jamie Caplan,** Jamie Caplan Consulting, LLC
  - 413-586-0867
  - jamie@jamiecaplan.com
- **David Murphy,** Milone & MacBroom
  - 203-271-1773
  - davem@miloneandmacbroom.com
- **Darrin Punchard,** Punchard Consulting LLC
  - 617-777-2001
  - darrin@punchardconsulting.com

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FEBRUARY 8, 2018

SCRCOG
SOUTH CENTRAL REGIONAL COUNCIL OF GOVERNMENTS
Planning for Our Region's Future

Bethany Branford East Haven Guilford Hamden Madison Meriden Milford
New Haven North Branford North Haven Orange Wallingford West Haven Woodbridge

Carl J. Amento, Executive Director

South Central Regional Multi-Jurisdiction
Hazard Mitigation Plan Update

AGENDA
February 8, 2018
Advisory Committee Meeting

Project Status Update/Public Outreach
- Municipality Public Meetings
- Public Survey
- Regional Public Meeting

Risk Assessment and Capability Assessment
- Problem Statements
- Capability Tables

Mitigation Strategy
- Goals & Objectives
- Progress of Local Mitigation Efforts
- Updated/New Mitigation Actions
- Evaluating and Prioritizing Mitigation Actions
- Regional Mitigation Priorities and Actions

Plan Implementation Discussion

Next Steps
- Regional Public Meeting
- Finish and Prioritize Mitigation Actions
- Review Draft Plan

For more information:
Eugene Livshits, Senior Regional Planner
203-466-8626
elivshits@scrcog.org
http://scrcog.org/regional-planning/regional-hazard-mitigation/

Advisory Committee Meeting 2/8/18

Advisory Committee Meeting
February 8, 2018

South Central Regional Multi-Jurisdiction Hazard Mitigation Plan Update

AGENDA

1. Project Status Update/Public Outreach
2. Risk Assessment/Capability Assessment
3. Mitigation Strategy
4. Plan Implementation
5. Next Steps

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TIMELINE

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PUBLIC SURVEY

- 170 Responses
  - 35% from Branford
  - Hamden
  - Madison
- Hurricane/Tropical Storm and Severe Winter Storm/Nor'easter biggest concerns
- 87% believe storms are increasing in frequency and severity due to climate change and we should prepare accordingly
- Most effective way to receive information?
  - 60% Text or email
  - Mail
  - Website
- 33% Have a "Household Emergency Plan"

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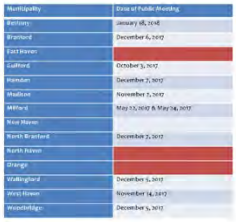
Municipality Public Meetings



Submit documentation if you haven't.

Plans to hold a meeting?

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Regional Public Meeting

- Thursday, February 22, 2018 in East Haven?

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Advisory Committee Meeting 2/8/18

RISK ASSESSMENT AND CAPABILITY ASSESSMENT

- Review Problem Statements for accuracy
- Review Capability Assessment tables for accuracy

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MITIGATION GOALS

Goal Categories	Mitigation Plan Goals
Community Planning	1. Reduce the impact of natural hazards by integrating natural hazard mitigation policies and practices into local community planning.
Flood Hazards	2. Minimize flood hazards in the region by maintaining continued compliance with the National Flood Insurance Program, adopting higher regulatory standards for new floodplain development, and implementing flood mitigation projects for existing flood prone structures.
Trees	3. Limit the impact of fallen trees due to natural hazards by collaborating with electric utility companies and property owners (private and public) to cut limbs and remove hazardous trees that pose threats to buildings, infrastructure and utility lifelines.
Regional Collaboration	4. Build capacity for natural hazard mitigation and climate adaptation at the local level through regional collaboration.
Public Awareness and Preparedness	5. Increase public awareness and preparedness for natural hazards by implementing community-based public education programs across the region.

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TREES

- Diane Hoffman, Hamden Alliance for Trees:
  - A Harvard University report recently released says that *"Connecticut is losing about 3,700 acres of forest a year to development and New England as a whole is seeing its woodlands disappear at a rate of 65 acres a day."*
  - A United Illuminating report states that of 1,460 trees removed in Hamden in 2016, 137 were hazard trees.
  - "I see that extensive tree pruning is called for in the plan and I believe there should also be a voice for increased tree planting and proper tree maintenance in the plan."
  - "What actions do you think HAT and the Tree Commission could take to influence a greater green approach to addressing the problem of growing storms and resulting flooding and other environmental challenges?"
  - "This is an opportunity to put our understanding of the essential services that trees provide, into action through a more comprehensive Hazard Mitigation Plan."

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MITIGATION GOALS (REVISION OPTION #1)

Goal Categories	Mitigation Plan Goals
Community Planning	1. Reduce the impact of natural hazards by integrating natural hazard mitigation policies and practices into local community planning.
Flood Hazards	2. Minimize flood hazards in the region by maintaining continued compliance with the National Flood Insurance Program, adopting higher regulatory standards for new floodplain development, and implementing flood mitigation projects for existing flood prone structures.
Trees	3. Limit the impact of fallen trees due to natural hazards by promoting the preservation, maintenance, and enhancement of a healthy tree canopy and collaborating with electric utility companies and property owners (private and public) to cut limbs and remove hazardous trees that pose threats to buildings, infrastructure and utility lifelines.
Regional Collaboration	4. Build capacity for natural hazard mitigation and climate adaptation at the local level through regional collaboration.
Public Awareness and Preparedness	5. Increase public awareness and preparedness for natural hazards by implementing community-based public education programs across the region.

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MITIGATION GOALS (REVISION OPTION #2)

Goal Categories	Mitigation Plan Goals
Community Planning	1. Reduce the impact of natural hazards by integrating natural hazard mitigation policies and practices into local community planning.
Flood Hazards	2. Minimize flood hazards in the region by maintaining continued compliance with the National Flood Insurance Program, adopting higher regulatory standards for new floodplain development, and implementing flood mitigation projects for existing flood prone structures.
Trees	3. Support increased planting and proper care of healthy, native trees across the region to increase its resilience to natural hazards including severe storms, flooding, erosion, and extreme heat. Limit the impact of fallen and other hazardous trees by collaborating with utility companies and property owners to cut limbs and remove trees that pose threats to buildings, infrastructure and utility lifelines.
Regional Collaboration	4. Build capacity for natural hazard mitigation and climate adaptation at the local level through regional collaboration.
Public Awareness and Preparedness	5. Increase public awareness and preparedness for natural hazards by implementing community-based public education programs across the region.

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SCRCOG MITIGATION PLAN OBJECTIVES

Objective Category	Mitigation Plan Objectives
Mitigation Planning	1. Stay actively involved in mitigation planning for the SCRCOG region.
Multi-Jurisdiction Collaboration	2. Facilitate multi-jurisdiction collaboration between the SCRCOG jurisdictions.
Education	3. Provide education regarding natural hazards, grant opportunities, and mitigation and preparedness techniques.
Floodplain Management	4. Assist the SCRCOG jurisdictions with floodplain management and lessening the impact of flooding to the region.

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Advisory Committee Meeting 2/8/18

PROGRESS OF LOCAL MITIGATION EFFORTS

- Status updates provided for *nearly* all prior mitigation actions, for all jurisdictions *(THANK YOU!)*

PROGRESS OF LOCAL MITIGATION EFFORTS

The purpose of this section is to document and demonstrate the current status and progress made in achieving the goals outlined in the previous plan's mitigation strategy, and more specifically in completing prior mitigation actions as adopted by each participating jurisdiction. This section includes a tabular report for each jurisdiction, listed in alphabetical order, that includes a brief summary of the current status of each action and whether it has been carried over into the updated plan. For the four (4) jurisdictions that joined this regional plan update in 2017 (East Haven, Guilford, Milford, and New Haven), this report includes the status of mitigation actions as identified in their most recently adopted plan.

For any actions that have been carried over into the updated plan, the new action number is provided for reference under the last column in the table ("Keep for Plan Update?"). For those actions that were not carried over, a narrative explanation for why not is provided in the column titled "Status Description / Explanation." All new/updated mitigation actions for 2018-2023, including those that have been carried over from a previous plan, can be found for each jurisdiction under the subsection titled "Comprehensive Range of Mitigation Actions."

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PROGRESS OF LOCAL MITIGATION EFFORTS

NEW HAVEN

City of New Haven – Status of Prior Mitigation Actions

Action #	Action Title	Action Description	Current Status	Status Description / Explanation	Keep For Plan Update?
1	Extension of Fairlee Seawall in Morris Cove	Installation of seawall in front of private homes on Townsend Avenue for flood prevention.	Partially Completed / In Progress	Conceptual design of project has been reviewed by DEEP. Design is scheduled for 2017 and construction is scheduled for 2018.	YES (see Action #1)
2	Brewery Square Bulkhead (public)	Installation of sheet piling 18 inches outside of the existing seawall and restoration of the public walk area along the shore.	Partially Completed / In Progress	Project has been designed and approved by the State DEEP. It is currently under construction.	YES (see Action #2)
3	River Street Bulkhead	Shoreline stabilization along city property to prevent further erosion along the Quinnipiac River including sections of steel bulkhead and revetments with public access.	Partially Completed / In Progress	Concept plan developed by Roberge Associates. Study completed. Awaiting grants and permits for implementation. Lloyd Street project has permits. Design sketches were completed.	YES (see Action #3)
4	Long Wharf Park Shoreline Restoration	Repair damage to park from Superstorms Irene and Sandy. Restore to pre- Irene conditions.	Completed	Project completed.	NO (see explanation at left)
5	Long Wharf Park Shoreline Enhancement	Design a living shoreline to reduce wave energy and retain sediment while providing enhanced habitat value. This will be situated waterward of the restored shoreline.	Canceled	Preliminary concept has been developed. Design funds will be sought from CIRCA or other entity. This project is now merged with Long Wharf Flood Protection Study listed below.	NO (see explanation at left)
6	Long Wharf Park Shoreline Enhancement	Construct a living shoreline to reduce wave energy and retain sediment while providing enhanced habitat value. This will be situated waterward of the restored shoreline.	Canceled	Preliminary concept has been developed. Design funds will be sought from CIRCA or other entity. Construction will follow. This project is now merged with Long Wharf Flood Protection Study listed below.	NO (see explanation at left)
7	Long Wharf Flood Protection	A study to prepare storm surge and sea level rise model for the Long Wharf area to assess risk and propose protection and resilience strategies.	Completed	Study completed in March 2017. Four alternatives were proposed including hard and soft solutions. City prefers the living shoreline solution for the short term.	NO (see explanation at left)
8	Long Wharf Flood Protection	Implement flood protection recommendations from Long Wharf Flood Protection study.	Delayed	Study completed but no funds identified yet for implementation.	YES (see Action #4)

UPDATED/NEW MITIGATION ACTIONS

- Updated/new actions for 2018-2023 identified for all jurisdictions
  - Most are prior actions being carried over from previous plan, and/or from Coastal Resilience Plans
  - Need to update/affirm implementation information (e.g., ***Estimated Cost, Funding Source, Lead Department***)
  - Need to assign ***Implementation Schedule*** and ***Priority***
  - Additional draft ideas for "new" actions have been noted (in red font) in the updated action table for each jurisdiction

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UPDATED/NEW MITIGATION ACTIONS

Hamden Mitigation Actions

Town of Hamden – Updated Mitigation Actions (2018-2023)

Action #	Action Title	Action Description	Estimated Cost	Potential Funding Source	Lead Department	Implementation Schedule	Priority
1	Tree Pruning	Tree pruning adjacent to power distribution wires	$50,000	United Illuminating and its contractors	United Illuminating		
2	FEMA Flood Study Update - Part II	Update FEMA Flood study for Hamden using LiDAR technology.	$15,000	FEMA	FEMA		
3	Snow Load Study	Study town buildings to determine snow removal criteria.	$30,000	Local Capital Budget	Town of Hamden		
4	Raise Paradise Avenue South of Howard Drive	Raise Paradise Avenue south of Howard Drive.	$500,000 - $ 600,000	Local Capital Budget	Town of Hamden		
5	Skiff Street Bridge Replacement	Replace Skiff Street bridge with a wider one that will reduce upstream flooding.			Hamden Engineering	September 2017 - September 2019	
6	Replace Mill River Pump Station		$15,000,000				
7	Replace pipe on Tom Swamp Road?	Replace existing 60" pipe that's crushed with a 8' concrete pipe.					
8	Emergency Vehicle for Winter Storms	Acquire vehicle to help responders access people in heavy snow					
9	Higher Regulatory Standards for Floodplain Development	Impose additional requirements on new construction in Special Flood Hazard Areas					
10	Expand Storm Water Drainage Improvements						
11	Develop Public Education Programs	Specific programs include: (1) Encourage citizens to keep streams and culverts on their property clear of debris; (2) Prevent wheeled litter and debris what to do if a disaster strikes; (3) Encourage people to enroll in the emergency warning system.					

EVALUATING & PRIORITIZING MITIGATION ACTIONS

- Evaluating Actions
  - Revisit problem statements and consult with other municipal staff to identify and evaluate NEW actions
  - Focus on *actionable, measurable* projects or activities
  - Consider cancelling/deleting actions that have become an "existing capability or ongoing activity" (e.g., routine maintenance, SOPs, or other regularly occurring actions)
- Prioritizing Actions
  - Classify each action as either *High*, *Medium*, or *Low* priority

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EVALUATING & PRIORITIZING MITIGATION ACTIONS

Criterion	Description / Questions to Consider
Benefit-Cost Review	Are the total estimated costs to implement the action (including any maintenance or operations costs) reasonable when compared to the probable long-term benefits (including future losses avoided and other anticipated benefits such as improved quality of life, environmental benefits, and achieving other community goals)?
Life Safety	How effective will the action be at protecting lives and preventing injuries?
Property Protection	How significant will the action be at eliminating or reducing damage to structures and infrastructure?
Technical	Is the mitigation action technically feasible? Is it a long-term solution? Actions that, from a technical standpoint, will not meet the goals should be eliminated.
Political	Is there overall public support for the mitigation action? Is there the political will to support it?
Legal	Does the community have the authority to implement the action?
Environmental	What are the potential environmental impacts of the action? Will it comply with environmental regulations?
Social	Will the proposed action adversely affect one segment of the population? Will the action disrupt established neighborhoods, break up voting districts, or cause the relocation of lower income and/or minority populations?
Administrative	Does the community have the personnel and administrative capabilities to implement the action and maintain it or will outside help be necessary?
Local Champion	Is there a strong advocate for the action or project among local departments and agencies that will support the action's implementation?
Other Community Objectives	Does the action advance other community objectives, such as capital improvements, economic development, environmental quality, or open space preservation? Does it support the policies of the comprehensive plan?

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Advisory Committee Meeting 2/8/18

MITIGATION PRIORITIES

- **Very High** – extremely beneficial projects that will greatly contribute to mitigation of multiple hazards and the protection of people and property. These projects are also given a numeric ranking within the category.
- **High** – Strategies that provide mitigation of several hazards and have a large benefit that warrants their cost and time to complete.
- **Medium** – Strategies that would have some benefit to people and property and are somewhat cost effective at reducing damage to property and people.
- **Low** – Strategies that would not have a significant benefit to property or people, address only one or two hazards, or would require funding and time resources that are impractical.

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REGIONAL MITIGATION PRIORITIES (2014)

Goal Categories	Regional Mitigation Priorities
Community Planning	• Local zoning regulation changes (e.g. reducing allowable lot coverage and floor area) • Revise building codes
Flood Hazards	• Elevate roads • Floodgates on drainage systems • Erosion protection • Raise/elevate/floodproof buildings • Raise homes in floodplain
Trees	• Limit hazards to utility infrastructure • Clear trees off power lines
Regional Collaboration	• Regional coordination, planning and sharing of information, approaches and outcomes • Regional map of high-hazard places, in each town (parcel scale)
Public Awareness and Preparedness	• Equip all shelters with back-up power

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REGIONAL ISSUES RAISED BY THE RISK ASSESSMENT

- REGIONAL ISSUES: Issues that are shared by all, and could be addressed regionally. Examples:
  - **Sea Level Rise** – communities are beginning to develop their own visions, but CIRCA will be developing a statewide coastal resilience plan that focuses on patterns of TOD, redevelopment, and safe evacuation routes; some coordination is needed
  - **Historic Resources** – all communities have them; SHPO is concerned with them all but is capable of viewing values from a high level; mitigation actions should take this into account
  - **Sewer Pumping Stations** – GNHWPCA serves several communities
  - **Water Utilities** – South Central Regional Water Authority (RWA) serves several communities
  - **Power Utilities** – UI and Eversource serve multiple communities
  - **Significant Assets** such as Tweed New Haven airport – the East Haven HMP and the New Haven HMP addressed it separately

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REGIONAL MITIGATION ACTIONS

- Greater New Haven WPCA
- South Central Regional Water Authority (RWA)
- Port of New Haven
- Long Wharf
- Metro North and Amtrak lines
- Tweed New Haven Airport
- Beaches of Significant Regional Importance:
  - Hammonasset Beach
  - West Haven Beach/Savin Rock Beach
- Historic Resources – ***actions that SHPO can or should take to benefit all towns***

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200+ MUNICIPAL-SPECIFIC MITIGATION ACTIONS

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REGIONAL MITIGATION PRIORITIES (2018-2023)

Goal Categories	Regional Mitigation Priorities
Community Planning	• Local zoning regulation changes (e.g. reducing allowable lot coverage and floor area) • Revise building codes
Flood Hazards	• Elevate roads • Floodgates on drainage systems • Erosion protection • Raise/elevate/floodproof buildings • Raise homes in floodplain
Trees	• Limit hazards to utility infrastructure • Clear trees off power lines
Regional Collaboration	• Regional coordination, planning and sharing of information, approaches and outcomes • Regional map of high-hazard places, in each town (parcel scale)
Public Awareness and Preparedness	• Equip all shelters with back-up power • Protect critical facilities are assets of regional significance • Protect historic and cultural resources (with support from CT SHPO) • Help small businesses mitigate impacts of natural hazards (with support from CT DEEP) • *OTHER IDEAS?*

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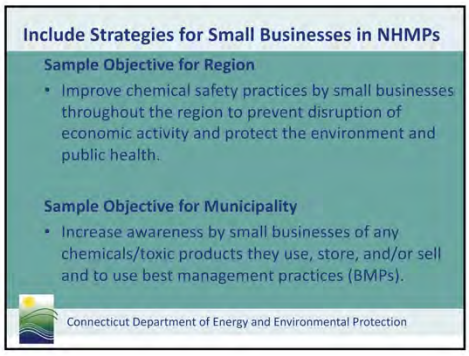
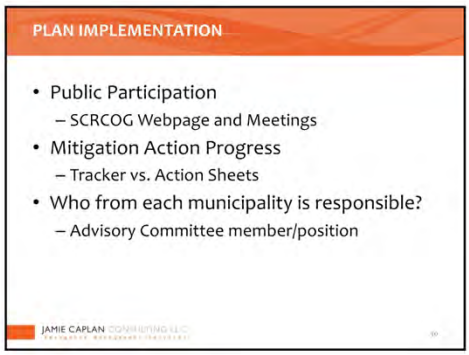
Advisory Committee Meeting 2/8/18





Advisory Committee Meeting 2/8/18

NEXT STEPS

- Regional Public Meeting
- Finish and Prioritize Mitigation Actions
- Review Draft Plan
- Plan Adoption

JAMIE CAPLAN

THANK YOU

- **Jamie Caplan,** Jamie Caplan Consulting, LLC
  - 413-586-0867
  - jamie@jamiecaplan.com
- **Darrin Punchard,** Punchard Consulting LLC
  - 617-777-2001
  - darrin@punchardconsulting.com

JAMIE CAPLAN

Name	Title	Organization	Phone	E-Mail	Initials
Clark Hurlburt	Deputy EMD/CERT coord.	Bethany		clarkhurlburt@sbcglobal.net	CDH.
Isabel Kearns	ZEO/ Land Use Admin	Bethany	203-393-2100 x135	IKearns@Bethany-ct.com	
Janice Plaziak	Town Engineer	Branford	203-315-0606	jplaziak@branford-ct.gov	
Matthew Marcarelli	Fire Chief	East Haven	203-468-3221	mmarcarelli@easthavenfire.com	MJM
Kevin White	Town Engineer	East Haven	203-468-3250	eh.kwhite@gmail.com	
Kevin Magee	Environmental Planner	Guilford	203-453-8074	mageek@ci.guilford.ct.us	
James Portley	Town Engineer	Guilford	203-453-8037	portleyJ@ci.guilford.ct.us	
Mark Austin	Town Engineer	Hamden	203-287-7040	maustin@hamden.com	
Matt Davis	Assistant Planner	Hamden	(203) 287-7077	mdavis@hamden.com	MD
Andrew Kinlock	GIS Coordinator	Hamden	(203) 287-7049	akinlock@hamden.com	
Jamie Caplan	Principal	Jamie Caplan Consulting LLC	413-586-0867	Jamie@jamiecaplan.com	
David Anderson	Town Planner	Madison	203-245-5632	andersond@madisonct.org	DMA
Michael Ott	Town Engineer/ DPW	Madison	203-245-5611	ottm@madisonct.org	
Robert Hiza		Madison		russor@madisonct.org	
Meg McGaffin	GIS Analyst	Milford	203-701-7746	mmcgaffin@ci.milford.ct.us	
MaryRose Palumbo	Inland Wetland Agent	Milford	203-701-4452	mpalumbo@ci.milford.ct.us	MRP
Bill Richards	Deputy Emergency Management Director	Milford	203-671-6661	wrichards@ci.milford.ct.us	
Chris Saley	Public Works Director	Milford	203-783-3269	csaley@ci.milford.ct.us	
David Murphy	Manager of Water Resources Planning	Milone & MacBroom	203-271-1773	davem@miloneandmacbroom.com	
~~Karyn Gilvarg~~	~~City Plan Department~~	~~New Haven~~	~~203-946-6379~~	~~kgilvarg@newhavenct.net~~	
~~George Gremelas~~	~~City Plan Department~~	~~New Haven~~		~~cpintern@newhavenct.gov~~	
Donna Hall	City Plan Department	New Haven	203-946-7842	dhall@newhavenct.net	
Michael Piscitelli	City Plan (Int Director)	New Haven		mpiscite@newhavenct.gov	~~MP~~
Stacey Davis	City Plan Dept.	New Haven	203-946-6379	sdavis@newhavenct.gov	
Steve Johnson	O.Space	Milford	203 878 7812	stevenjohnson@ci.milford.CT.US	
Isabella Schroeder	Sr. Eng.	GNHWPCA	203-466-5280	ischroeder@gnhwpca.com	

SCRCOG Mitigation Plan Advisory Committee Meeting, February 8, 2018

Kurt Weiss	Town Engineer	North Branford	203-484-6009	townengineer@townofnorthbranfordct.com	
Jonathan Bodwell	Town Engineer	North Haven	203-239-5321 x430	bodwell.jonathan@town.north-haven.ct.us	
Robert Hiza	Town Engineer	Orange	203-891-4741	rhiza@orange-ct.gov	
Fred Palmer	Director of Emergency Management	Orange	203-444-2733	fredpalmer63@gmail.com	
Mary Shaw	Administrative Assistant to First Selectman	Orange		mshaw@orange-ct.gov	
James Zeoli	First Selectman	Orange		jzeoli@orange-ct.gov	
Darrin Punchard	Principal	Punchard Consulting LLC	617-777-2001	Darrin@punchardconsulting.com	
Carl Amento	Executive Director	South Central Regional Council of Governments	203-466-8625	camento@scrcog.org	
Rebecca Andreucci	Regional Planner	South Central Regional Council of Governments	203-466-8601	randreucci@scrcog.org	
Stephen Dudley	Deputy Director	South Central Regional Council of Governments	203-466-8624	sdudley@scrcog.org	
Eugene Livshits	Senior Regional Planner	South Central Regional Council of Governments	203-466-8626	elivshits@scrcog.org	✓
Christopher Rappa	Transportation Planner	South Central Regional Council of Governments	203-466-8610	cirappa@scrcog.org	
Richard Heidgerd	Fire Chief	Wallingford	203-294-2730	rheidgerd@wallingfordfd.com	
Abdul Quadir	Civil Engineer	West Haven	203-937-3577	abdul_quadir@cityofwesthaven.com	
Warren Connors	Public Works Director	Woodbridge	203-389-3421	wconnors@woodbridgect.org	
Kelly Hammill	Office Manager	Woodbridge	203-389-3492	akinlock@hamden.com	

REGIONAL PUBLIC WORKSHOP

REGIONAL PUBLIC WORKSHOP FLYER

SCRCOG SOUTH CENTRAL REGIONAL COUNCIL OF GOVERNMENTS
Planning for Our Region's Future

South Central Region Hazard Mitigation Plan Update

HAZARD MITIGATION PUBLIC MEETING

WHEN

February 22, 2018
5:00 – 6:00 P.M.

WHERE

Foxon Firehouse
1420 North High Street
East Haven, CT, 06512

Your participation is needed!

Come learn about hazard mitigation. Regional Meeting to Review **Multi-Jurisdiction Hazard Mitigation Plan Update**. Plan includes 14 SCRCOG Municipalities.

The purpose is to provide the region with a comprehensive examination of all natural hazards effecting the area and to provide a framework for informed decision-making regarding the selection of cost-effective mitigation actions.

Provide your ideas regarding lessening the impact of natural hazards in your region.

Available in English and Spanish
www.surveymonkey.com/r/CTMitigation

For more information visit:
www.scrcog.org/regional-planning/regional-hazard-mitigation

REGIONAL PUBLIC WORKSHOP PRESS RELEASE

SCRCOG
SOUTH CENTRAL REGIONAL COUNCIL OF GOVERNMENTS
Planning for Our Region's Future

Bethany Branford East Haven Guilford Hamden Madison Meriden Milford
New Haven North Branford North Haven Orange Wallingford West Haven Woodbridge

Carl J. Amento, Executive Director

Public Invited to a Regional Public Meeting regarding the Draft South Central Region Multi-Jurisdiction Hazard Mitigation Plan Update

(NORTH HAVEN) The South Central Regional Council of Governments (SCRCOG) is hosting a regional meeting with the East Haven Fire Department to present, review and discuss the Draft South Central Region Multi-Jurisdiction Hazard Mitigation Plan Update. The purpose of this plan is to identify and assess natural hazard risks (such as flooding, winter storms, and hurricanes) and determine how to best minimize or manage those risks. Public participation is an important part of the mitigation planning process. Residents, business owners and town officials of the SCRCOG municipalities are encouraged to participate in these workshops.

The Public Meeting will take place on:

February 22, 2018
5:00 – 6:00 pm
Foxon Firehouse
1420 North High Street, East Haven, CT 06512.

During this public meeting, the contents of the plan will be introduced and members of the public will have the opportunity to discuss ideas regarding risk reduction. **All community members are welcome to attend!**

To help increase public participation SCRCOG has launched the South Central Connecticut Hazard Mitigation Plan Survey that provides an opportunity for everyone in the planning area to share his or her opinions and participate in the mitigation planning process. The information provided will help the Planning Team to better understand local concerns and issues as expressed by citizens of the Region, and can lead to mitigation activities that should help lessen the impacts of future disasters.

Participation in this survey is voluntary and none of the information provided will be attributed to individuals directly. The survey is located on the SCRCOG website and will only take about 5 minutes to complete. It is available in **English and Spanish**. To participate in the survey, go to: https://www.surveymonkey.com/r/CTMitigation

To learn more about the project please visit the project webpage at http://scrcog.org/regional-planning/regional-hazard-mitigation/.

For more information:
Eugene Livshits, Senior Regional Planner
203-466-8626
elivshits@scrcog.org
http://scrcog.org/regional-planning/regional-hazard-mitigation/

REGIONAL PUBLIC WORKSHOP ANNOUNCEMENT

Draft South Central Region Hazard Mitigation Plan update for

Bethany, Branford, East Haven, Guilford, Hamden, Madison, Milford, New Haven, North Branford, North Haven, Orange, Wallingford, West Haven and Woodbridge

The South Central Regional Council of Governments (SCRCOG) is hosting a public meeting to provide the region with a comprehensive examination of all natural hazards effecting the area and to provide a framework for informed decision-making regarding the selection of cost-effective mitigation actions.

Provide your ideas regarding lessening the impact of natural hazards in your region.

The Public Meeting will be held:

February 22, 2018 at 5:00 PM – Foxon Firehouse, 1420 North High Street, East Haven, CT, 06512

Visit our website www.scrcog.org for more details.

LEGAL NOTICES

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USA

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Draft South Central Region Hazard Mitigation Plan update for

Bethany, Branford, East Haven, Guilford, Hamden, Madison, Milford, New Haven, North Branford, North Haven, Orange, Wallingford, West Haven and Woodbridge

The South Central Regional Council of Governments (SCRCOG) is hosting a public meeting to provide the region with a comprehensive examination of all natural hazards effecting the area and to provide a framework for informed decision-making regarding the selection of cost-effective mitigation actions.

Provide your ideas regarding lessening the impact of natural hazards in your region.

The Public Meeting will be held:

February 22, 2018 at 5:00 PM – Foxon Firehouse, 1420 North High Street, East Haven, CT, 06512 Visit our website www.scrcog.org for more details.

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Run Dates
2/16/2018

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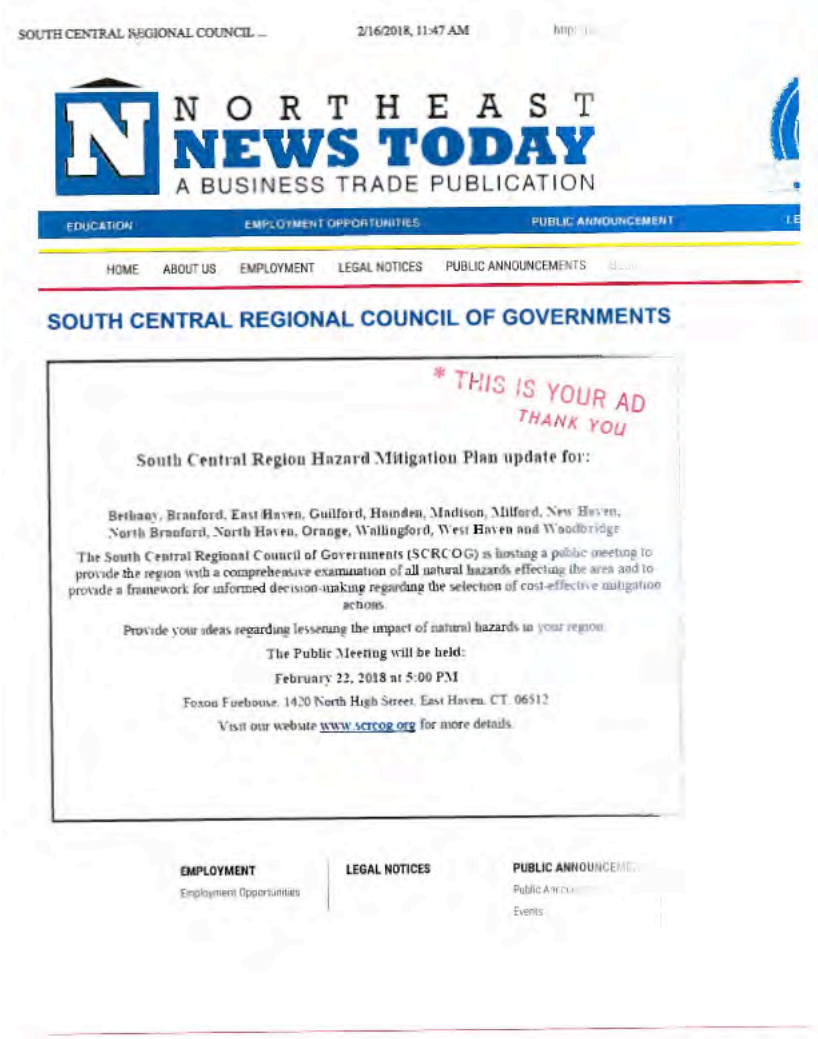
nhregister.com	1	Public Notices

Note: Retail Display Ads May Not End in Identified Placement

Run Dates
2/16/2018



SOUTH CENTRAL REGIONAL COUNCIL ... 2/16/2018, 11:47 AM

NORTHEAST NEWS TODAY
A BUSINESS TRADE PUBLICATION

EDUCATION EMPLOYMENT OPPORTUNITIES PUBLIC ANNOUNCEMENT

HOME ABOUT US EMPLOYMENT LEGAL NOTICES PUBLIC ANNOUNCEMENTS

SOUTH CENTRAL REGIONAL COUNCIL OF GOVERNMENTS

* THIS IS YOUR AD
THANK YOU

South Central Region Hazard Mitigation Plan update for:

Bethany, Branford, East Haven, Guilford, Hamden, Madison, Milford, New Haven, North Branford, North Haven, Orange, Wallingford, West Haven and Woodbridge

The South Central Regional Council of Governments (SCRCOG) is hosting a public meeting to provide the region with a comprehensive examination of all natural hazards effecting the area and to provide a framework for informed decision-making regarding the selection of cost-effective mitigation actions.

Provide your ideas regarding lessening the impact of natural hazards in your region.

The Public Meeting will be held:

February 22, 2018 at 5:00 PM

Foxon Firehouse, 1420 North High Street, East Haven, CT 06512

Visit our website www.scrcog.org for more details.

EMPLOYMENT
Employment Opportunities

LEGAL NOTICES

PUBLIC ANNOUNCEMENTS
Public Announcements
Events

DRAFT SOUTH CENTRAL REGION HAZARD MITIGATION PLAN UPDATE FOR

Borrador de la Actualización del Plan de Mitigación de Riesgos para la región Sur central

Bethany, Branford, East Haven, Guilford, Hamden, Madison, Milford, New Haven, North Branford, North Haven, Orange, Wallingford, West Haven and Woodbridge

El **South Central Regional Council of Governments** (Consejo de gobierno regional sur central) (SCRCOG), está organizando una reunión pública para proporcionar a la región un amplio examen de todos los peligros naturales que afectan el área, además del marco adecuado para facilitar tomas de decisiones en cuanto a la selección de medidas económicas de mitigación.

Proponga sus ideas sobre cómo reducir el impacto de los peligros naturales en su región.

La Reunión Publica se dará:

22 de febrero, 2018 a las 5:00 PM

Foxon Firehouse
1420 North High Street
East Haven, CT 06512

Para más detalle visite nuestro **web www.scrcog.org**

REGIONAL PUBLIC WORKSHOP SIGN-IN SHEET

REGIONAL PUBLIC MEETING SIGN-IN SHEET

Project:	SCRCOG Multi-Jurisdiction Mitigation Plan	**Meeting Date:**	February 22, 2018
Facilitator:	Jamie Caplan	**Place/Room:**	East Haven Firehouse

Name	City/Town of Residence	E-Mail (optional)
Diane Hoffman	Hamden	dianehoffman@att.net
Louise LaMontagne	Branford	llr2k@ymail.com
Nancy Mancini	Branford	tuliptree333@sbcglobal.net
Kevin Magee	Guilford	mageek@ci.guilford.ct.us
Judy Thamm	Hamden	judy.thamm@sbcglobal.net
Steve Johnson	Milford	StevenJohnson@ci.Milford.ct.us
MaryRose Palumbo	Milford	MPalumbo@ci.Milford.ct.us
Chuck Licata	East Haven	CLicata@eastHavenFire.com
Matthew Marcarelli	EAST HAVEN	mmarcarelli@eastHavenFire.com
Jerry Trantas	East Haven	eh.trantas@gmail.com
Kevin White	East Haven	eh.kwhite@gmail.com
Stacey Davis	New Haven	sdavis@newhavenct.gov
Eugene Livshits	SCRCOG	elivshits@scrcog.org
Rebecca Andreucci	SCRCOG	randreucci@scrcog.org
Isabella Schroeder	GNHWPCA	ischroeder@gnhwpca.com
Thomas Perlgieri	Hamden	twperlgieri@aol.com
Mario Ricozzi	GNHWPCA	mricozzi@gnhwpca.com
Ed Hayden	East Haven	shabammie@sbcglobal.net

JURISDICTION SPECIFIC PUBLIC WORKSHOPS

FLYER TEMPLATE FOR JURISDICTIONS

TOWN OF [INSERT TOWN]

SCRCOG
SOUTH CENTRAL REGIONAL COUNCIL OF GOVERNMENTS

DISASTER PLANNING PUBLIC MEETING

WHEN

September XX, 2017
6:00 P.M.

WHERE

Town Hall
Address
City, State

Your participation is needed!

Come learn about hazard mitigation. [INSERT TOWN] is working to identify ways to mitigate the impacts of natural hazards such as floods and severe winter weather.

The purpose is to provide the region with a comprehensive examination of all natural hazards effecting the area and to provide a framework for informed decision-making regarding the selection of cost-effective mitigation actions.

Provide your ideas regarding lessening the impact of natural hazards in your region.

Available in English and Spanish
www.surveymonkey.com/r/CTMitigation

For more information visit:
www.scrcog.org/regional-planning/regional-hazard-mitigation

PRESS RELEASE TEMPLATE

SCRCOG

SOUTH CENTRAL REGIONAL COUNCIL OF GOVERNMENTS

Planning for Our Region's Future

Bethany Branford East Haven Guilford Hamden Madison Meriden Milford
New Haven North Branford North Haven Orange Wallingford West Haven Woodbridge

Carl J. Amento, Executive Director

Public Meeting for Disaster Planning!

The public is invited to participate in a meeting regarding the development of the South Central Region Multi-Jurisdiction Hazard Mitigation Plan. (Insert city or town name) in conjunction with the South Central Regional Council of Governments (SCRCOG) and its municipalities are preparing an update to the Multi-Jurisdiction Hazard Mitigation Plan. The purpose of this plan is to identify and assess natural hazard risks (such as flooding, winter storms, and hurricanes) and determine how to best minimize or manage those risks. **Public participation is essential!**

The Public Meeting will take place on (insert date and time and location). This plan is essential to (insert city or town name) efforts to identify ways to lessen the impacts of natural hazards such as hurricanes, floods and severe winter weather. During this public meeting, the contents of the plan will be introduced and members of the public will have the opportunity to discuss ideas regarding risk reduction. **All community members are welcome to attend!**

To help increase public participation SCRCOG has launched the South Central Connecticut Hazard Mitigation Plan Survey that provides an opportunity for everyone in the planning area to share his or her opinions and participate in the mitigation planning process. The information provided will help the Planning Team to better understand local concerns and issues as expressed by citizens of the Region, and can lead to mitigation activities that should help lessen the impacts of future disasters.

Participation in this survey is voluntary and none of the information provided will be attributed to individuals directly. The survey is located on the SCRCOG website and will only take about 5 minutes to complete. It is available in **English and in Spanish**. To participate in the survey, go to: https://www.surveymonkey.com/r/CTMitigation

To learn more about the project please visit the project webpage at http://scrcog.org/regional-planning/regional-hazard-mitigation/.

For more information:
Eugene Livshits, Senior Regional Planner
203-466-8626
elivshits@scrcog.org
http://scrcog.org/regional-planning/regional-hazard-mitigation/

POWERPOINT PRESENTATION

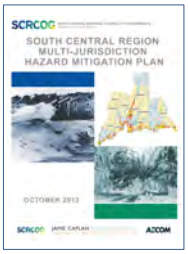
Advisory Committee Meeting 9/14/17

PUBLIC MEETING
[INSERT DATE AND LOCATION]

South Central Regional Multi-Jurisdiction Hazard Mitigation Plan Update

AGENDA

- Hazard Mitigation Planning
- Benefits of a FEMA Approved Mitigation Plan
- Developing a Hazard Mitigation Plan
- Natural Hazards Facing the Region
- Mitigation Actions
- Next Steps



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WHAT IS MITIGATION?

- Mitigation is the effort to reduce loss of life and property by lessening the impact of disasters.
- Disaster Mitigation Act of 2000 (amends the Stafford Act of 1988) and requires state and local governments to have a FEMA Approved Hazard Mitigation Plan to receive pre-disaster grant funding.

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What does hazard mitigation look like?

- Actions that reduce or eliminate long-term risk to people, property, and resources from natural hazards.

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Developing the Updated Mitigation Plan

1. Planning Process
2. Risk Assessment
3. Capability Assessment
4. Hazard Mitigation Strategy
5. Plan Maintenance Process
6. Update Adoption and Approval

- Two Regional Public Workshops in early 2018
- Draft Plan Ready for Review in February 2018
- State and FEMA review begins March 2018

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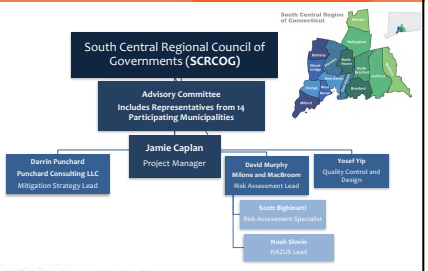
Who is Updating the Mitigation Plan



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Advisory Committee Meeting 9/14/17

What Natural Hazards Impact Southern Connecticut?



- Natural hazards are natural events that threaten lives, property, and other assets.

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MITIGATION STRATEGY

Mission Statement

Reduce or eliminate risk to people and property from natural hazards.

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2014 MITIGATION PLAN GOALS (these will be reviewed)

Goal Categories	Mitigation Plan Goals
Community Planning	1. Reduce the impact of natural hazards by integrating natural hazard mitigation policies and practices into local community planning.
Flood Hazards	2. Minimize flood hazards in the region by maintaining continued compliance with the National Flood Insurance Program, adopting higher regulatory standards for new floodplain development, and implementing flood mitigation projects for existing flood prone structures.
Trees	3. Limit the impact of fallen trees due to natural hazards by collaborating with electric utility companies and property owners (private and public) to cut limbs and remove hazardous trees that pose threats to buildings, infrastructure and utility lifelines.
Regional Collaboration	4. Build capacity for natural hazard mitigation and climate adaptation at the local level through regional collaboration.
Public Awareness and Preparedness	5. Increase public awareness and preparedness for natural hazards by implementing community-based public education programs across the region.

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Mitigation Success Stories

- [INSERT]

JAMIE CAPLAN CONSULTING LLC 10

PROJECTS YOU WOULD LIKE TO SEE

- [INSERT]

JAMIE CAPLAN CONSULTING LLC 11

Public Involvement

Survey Available Now!

English: https://www.surveymonkey.com/r/CTMitigation

Spanish: https://es.surveymonkey.com/r/CTMitigationSpanish

Plan Review in February 2018

JAMIE CAPLAN CONSULTING LLC 12

Advisory Committee Meeting 9/14/17

BETHANY

SIGN IN SHEET

SIGNATURE	PRINT NAME
Nancy McCarthy	Nancy McCarthy
Mary R. Scinto	Mary R. Scinto
Gerard Osgood	GERARD OSGOOD
Joanne Blanck	Joanne Blanck
Robin Glowa	Robin Glowa
April Stirling	APRIL STIRLING
Carol R. Goldberg	Carol R Goldberg
	BRUCE LOOMIS
	MARIC STRICKER
Jeanne DelVecchio	Jeanne DelVecchio
Eric C Lehman	Eric C Lehman
Ann P. Lehman	Ann P. Lehman
Melissa Spear	Melissa Spear
	SUE BERGER
	ROBERT HUXLEY
	James Ransom
	Alex Hitchcock
Isabel Kearns	Isabel Kearns
Jean Swanson	JEAN SWANSON
Celeste McKenzie	Celeste McKenzie
Mikey Hirschoff	Mikey Hirschoff
Patricia Wider	Patricia Wider
Louise Harper	LOUISE HARPER

SIGN IN SHEET –PAGE 2

SIGNATURE	PRINT NAME
Edmund R Caporaso	Edmund Caporaso
Tami E Caporaso	Tami Caporaso
Sue Hulbert	Sue Hulbert
Rich A Huxley	RICHARD Huxley
Sharon L Huxley	Sharon Huxley
[illegible]	Don Shea
Inez Kelso	
Inez Kelso	Inez Kelso
FK Doba	Frances K Doba
[illegible]	Lynette A. White
Nancy Jansen	Nancy Jansen
[illegible]	Shirley Lasch Cahill
[illegible]	Kimberly McClure Bruton
Mary C Ehler	Mary C Ehler
Donna Shea	Donna Shea
Mary Ellen McDevitt	ME McDevitt
Nancy Spagnolo	Nancy Spagnolo
[illegible]	LES PATZIG
Gene Frolich	GENE FROLICH
Grant E Frolich	GRANT E. FROLICH
Gwen B Weltman	Gwen B Weltman
[illegible]	JOHN GRASONSKI
Carol Lambiase	carol lambiase

BRANFORD

PUBLIC MEETING SIGN-IN SHEET

Project:	SCRCOG Multi-Jurisdiction Mitigation Plan	**Meeting Date:**	December 6, 2017 @ 6:30pm
Facilitator:	Janice A Plaziak, PE, Town Engineer Branford	**Place/Room:**	Fire HQ Building

Name	City/Town of Residence	E-Mail
Dan Gregory	milford	dgregoryatBranford-ct.gov
Brian Devlin	madison	bdevlin@branford-ct.gov
Trista Milici	Branford	tmilici@branford-ct.gov
Bill Aniskovich	Branford	waniskovich@bswlaw.com
Steve Mazzacane	BFD	steve@smcconsultinggroup.com
[illegible]	BFD	[illegible]@halbransye.com
DIANA STRICKER	EAST HAVEN	DIANA.BRANFORDEAGLE@GMAIL.COM
Brianna Weller	ESDHD	Bweller@esdhd.org
Jack Ahern	BRANFORD	jAherne@BRANFORD-ct.gov
James Cosgrove	Branford	JCosgrove@Branford-CT.gov
Joseph Fitzgerald	Branford	

EAST HAVEN

East Haven's Public Meeting is included in the Regional Public Meeting above.

GUILFORD

PUBLIC MEETING SIGN-IN SHEET

Project: SCRCOG Multi-Jurisdiction Mitigation Plan	**Meeting Date:** 10/31/2017
Facilitator: Hank Graver	**Place/Room:** Guilford Community Center

Name	City/Town of Residence	E-Mail
Sue Robins	Guilford	
John Hennigson	Guilford	
Matt Hoey	Guilford	
Elise Low	Guilford	elow@hotmail.com
Sid Gale	Guilford	sfgale@earthlink.net
Bernard Lombardi	Guilford	B-LOMBARDI@COMCAST.NET
Ryan Magee	Guilford	
STEVE KOPS	GUILFORD	
Arnold Stretta	Guilford	
Judy Castellano	Guilford	
Dennis Johnson	Guilford	
Hank Graver	Guilford	

Politics & Government

Guilford Holding Disaster Planning Meeting Tonight, Survey Offered (Oct. 3)

The purpose of the meeting is to identify and assess natural hazard risks in towns, such as flooding, winter storms and hurricanes.

By Brian McCready (Patch National Staff) - Updated Oct 3, 2017 8:31 am ET

By Jack Kramer, Correspondent

GUILFORD, CT – Guilford, Connecticut and the entire Northeast haven't been ravaged by hurricanes as have Texas, Florida, Puerto Rico and the Caribbean Islands.

And officials want it to remain that way and are holding a "Public Meeting for Disaster Planning" at 7:30 p.m., Oct. 3rd at the Guilford Community Center on Church Street.

At that meeting, the South Central Region Multi-Jurisdiction Hazard Mitigation Plan will be reviewed.

Guilford in conjunction with the South Central Regional Council of Governments (SCRCOG) and its municipalities are preparing an update to the plan to identify and assess natural hazard risks in towns, such as flooding, winter storms and hurricanes.

Subscribe to the Guilford newsletter >

To help increase public participation in the process SCRCOG has put together a survey that provides everyone to share their opinion in the mitigation planning process. It is hoped the information provided will help the planning team better understand concerns and local issues by citizens of a particular town.

Those concerns, officials said, may lead to mitigation activities that could help lessen the impact of any future big storms.

Participation in the survey is voluntary and the information provided will not be attributed to any individuals who participate.

To participate in the survey, go to:
https://www.surveymoney.com./r/CTMitgation

For more information, you can call the senior regional planner, Eugene Livshits at 203-466-8626 or email elivshits@scrcog.org

Guilford Event Calendar

OCTOBER

SUN	MON	TUE	WED	THU	FRI	SAT
1	2	3	4	5	6	
8	9	10	11	12	13	14
15	16	17	18	19	20	21
22	23	24	25	26	27	28
29	30	31				

Featured Events

Wed Oct 11
Learn To Code Online and Open A Gateway to Your Future! Grades 6 - 8

Sat Oct 14
Cold Weather Countdown: How To Winterize Your House

HAMDEN

PUBLIC MEETING SIGN-IN SHEET

Project: SCRCOG Multi-Jurisdiction Mitigation Plan	**Meeting Date:** 12/7/17
Facilitator: Dan Kops & Mark Austin	**Place/Room:** Hamden Govt Center 3rd Flr Cnf Rm

Name	City/Town of Residence	E-Mail
Debbie DiLeone	Hamden	ddmazda@yahoo.com
Dave Lewis	HAMDEN	lewishcurt@yahoo.com
BOB FREEMAN	HAMDEN	BOB216ES@GMAIL.COM
Joe Mason	Hamden	joemase@aol.com
MATT DAVIS	–	MDavis@Hamden.com
Dan Kops	Hamden	dkops@hamden.com
FREDERICK JEWETT	HAMDEN	FRRS@ATT.NET
MARK AUSTIN	—	maustin@hamden.com

Town of Hamden
Planning Department

Hamden Government Center
2750 Dixwell Avenue
Hamden, CT 06518
Tel: (203) 287-7070
Fax: (203) 287-7075

TOWN CLERK
HAMDEN, CT
2017 NOV 17 A 10:18
REC'D AND FILED

November 17, 2017
New Haven Register
40 Sargent Drive
New Haven, CT 06511
Attn: Barbara

FAX#: 865-8360
Bill: 287-7071

RE: LEGAL NOTICE TO APPEAR IN THE NEW HAVEN REGISTER ON Tuesday, November 28, 2017
The Town of Hamden will hold a Public Information session for the South Central Region Multi-Jurisdiction Hazard Mitigation Plan on Thursday December 7, 2017 at 7:00p.m in the 3rd Floor Conference Room, Hamden Government Center, 2750 Dixwell Avenue, Hamden, CT.; *For additional information contact the Hamden Planning & Zoning Department.*

South Central Regional Hazard Mitigation Plan Update
Town of Hamden
Public Meeting Minutes
December 7, 2017, 7:00 pm
Hamden Government Center
2750 Dixwell Avenue

Hamden Town Planner Dan Kops called the meeting to order at 7:05 pm and introduced himself, as well as Town Engineer Mark Austin and Assistant Planner Matt Davis.

Mr. Kops also asked those in attendance to introduce themselves and indicate if they were affiliated with a particular agency or stakeholder group. Public attending agreed and it was noted that representation by the Town's CERC Team, as well as the Energy Committee were present.

Mr. Kops provided a power point presentation, including an overview of the project scope, objectives, schedule, team, relevant definitions and the methodology applied to the analysis of mitigation topics. Emphasis was placed on the fact that the Plan is a regional plan, public engagement is important and that this meeting was intended to provide public input with respect to issues of unique concern in Hamden, including mitigation strategies and/or tasks. In addition, emphasis was made to distinguish mitigation from emergency management, and that the focus of the Plan update is mitigation.

Mr. Kops also provided an overview of key hazards (e.g. flooding, winter storms, "nor'easters) and areas of Hamden that are subject to flooding and storm surge. Repetitive loss properties and costs were also identified and discussed.

Mr. Austin provided an overview of the 2014 Plan's mitigation strategies and associated tasks for Hamden, including an update as to which of these have been implemented. He noted that various complimentary projects and tasks have been completed, such as removal of obstructions to flood waters in key areas and reconstruction of various bridges in Hamden. Certain of the 2014 strategies/projects will be carried forward into the 2018 plan, including a study of snow loads and the replacement and upgrading of key infrastructure. Staff noted that, if implemented, these projects will further reduce (mitigate) the impacts of hazards in Hamden. Other types of initiatives will also be included such as public education and updating flood hazard area regulations, as new data, design standards and more accurate mapping become available.

Members of the public were invited to ask questions and make comments throughout the presentation and excellent input was provided by a small, but knowledgeable group. They made the following key points:

- Neither the Town of Hamden nor the SCRCOG is represented on the "Citizens Corp Council" a liaison/conduit between local volunteers active in energy management and FEMA. This body is

a potential source of information and/or support for funding that could support local volunteer activities. Mr. Austin suggested contacting the Town's new grant administrator in the Economic Development Office as a way of at least initiating dialogue.

- Hamden has no emergency management office or staff. Although the Director position exists, it is not funded, the Hamden EOC's utility is limited and the town's emergency shelter (HHS) is substandard. Town staff responded that while these are certainly valid points, the subject of the Plan update and thus the public engagement session, is hazard mitigation, and not emergency operations/response and related assets, programs, staffing, etc.

- One individual stressed the potential value of micro grids and noted their promotion by the State as well as and the availability of grant funding for local projects. It might be possible to include micro grids in the Hamden portion of the Regional Hazard Mitigation Plan

The public was encouraged to complete the on-line project survey and handouts were provided containing basic project information, contact persons, the survey link, etc. The survey link is now posted on the Hamden website.

MADISON

PUBLIC MEETING SIGN-IN SHEET

Project:	SCRCOG Multi-Jurisdiction Mitigation Plan	**Meeting Date:**	November 2, 2017
Facilitator:	David Anderson	**Place/Room:**	Madison Town Campus Room A

Name	City/Town of Residence	E-Mail
Ron Clark	Madison, CT	rclark.comsuctcshet.net
FRANCINE LARSON	Madison, CT	x
TOM BANISECH	MADISON CT	BANISEHT@MADISONCT.ORG
Woodie Weiss	Madison CT	woodie.weiss@icloud.com
John Iennaco	Madison CT	iennacoj@madisonct.org
Amanda Mitchell	Madison CT	amjkaplan@gmail.com
Laurie Ruderfer	Madison	lruderfer@madisonct.org
Tammy Rooney	Madison	tbrooney@aol.com

This is a printer-friendly version of an article from Zip06.com.

Article Published November 8, 2017

Madison Discusses Disaster Planning

Zoe Roos, Staff Writer

The surprise many felt with the effects of the Oct. 30 storm was on the minds of many Madison residents and officials when they gathered last week to discuss ways the town can better prepare for disaster.

The town is in the process of updating the South Central Region Multi-Jurisdiction Hazard Mitigation Plan, a multi-town plan that follows Federal Emergency Management Agency (FEMA) standards and provides specific suggestions for hazard mitigation.

The plan Madison currently uses and is a part of within the South Central Council of Governments (SCRCOG) was adopted back in 2014 and is now due for an update. At the Planning & Zoning Commission (PZC) meeting on Nov. 2, board members and citizens listened to a presentation from Town Planner Dave Anderson, who reviewed the existing plan, current threats to Madison, and possible mitigation strategies.

"As part of that update process, each of the municipalities are doing some public outreach efforts," he said. "This is an initial effort to try and solicit some input on the plan and try and make people aware that it is going on. This is the first of a few different public opportunities."

According to the current plan, Madison is susceptible to hurricanes, tropical storms, severe thunder, winter, and ice storms, coastal erosion, sea level rise, and flooding. Flooding is a main concern, according to Anderson, who said the value of at risk properties due to flooding totals close to $1.5 billion.

Certain areas and assets in town are particularly vulnerable. Circle Beach Road, Middle Beach Road, Hammonasset State Park, Tibbals Bridge Road, and low-lying neighborhoods are likely to be hit hard in a weather disaster. Community assets such as Surf Club, Town Campus (because it is in a special flood area), the Town Archives in the basement of Memorial Town Hall, and the Deacon John Grave House are also a high-risk, particularly when it comes to storm surge and flooding.

To combat some of these risks, the plan and the town have identified 18 mitigation strategies. The strategies vary in price and feasibility and include everything from radio infrastructure improvements (which are already complete), Surf Club dune restoration, using mapping programs to help with the planning effort, and implementing public outreach efforts to ensure residents are adequately prepared for natural hazard events. Anderson said the public outreach part is key.

"I think we will always be needing to do a better job with this," he said. "This week people felt that they didn't get adequate notice and everybody seems to get caught off guard so this is probably going to be a mitigation effort that is ongoing. I know the emergency management folks are trying to come up with a better communications strategy to deal with this."

First Selectman Tom Banisch said this week the town sent out calls, texts, and posted on the website with storm updates. While the Internet was down, people were still able to access some of that information on their cell phones.

"I think we have the pieces, but I think we need to push it out further to get more people involved because the 95-year-old woman who doesn't have a phone, she is not going to benefit from that," he said.

Communication and the recent storm that left many residents without power was the focus of discussion, but Energy & Efficiency Committee Chair Woodie Weiss said the town needs to think a little bigger in future.

"All of this is great, but my concern is how the town handles lengthy outages or weather events that impact not only critical town facilities like Town Hall and the Police Department, but also how we take care of our citizens," he said. "I don't see anything in any of these plans that keep medical facilities running, keeps sources of food available, allows sources of fuel to be maintained. It is not just electricity —so many other things could happen."

Weiss said the reality is power outages are getting longer and the systems are more complex, with so many people dependent on power, there needs to be a more robust plan in the event of a lengthy outage.

"I think there has to be a long-range plan put in place on how we protect our citizens and how we make sure everyone is going to be OK and uninjured during lengthy outages," he said. "…For example, keeping a walk-in medical center and talking with them and saying, 'Hey can you couple with Stop & Shop's generator?' With those kinds of things, then you have a physician on site who can handle a guy who cuts himself or something. I am not suggesting we build a hospital or something like that."

Residents in the audience agreed with Weiss's suggestion. Resident Laurie Ruderfer said getting the community involved in this kind of plan is important.

"There are a lot of people who live in the community," she said. "We live on the Post Road and my husband is a physician and often we get cleared earlier than a lot of other places, so he might be someone who is willing to be on-call to help out as a volunteer in the event there are problems. We may have a volunteer corps of people like the Red Cross does in times like this."

PZC Chair Ron Clark said that sort of community effort could be successful in Madison.

"I think we are fortunate that we live in a town where that is part of the DNA of the citizenry, coming and pitching in to do things," he said.

To learn more about the Hazard Mitigation Plan, visit www.madisonct.org.

GEI Consultants

City of Milford Crescent Beach

Meeting Sign-in Sheet

Project Name: Crescent Beach Resilience and Nourishment Project | **Project No:**

Meeting Title, Date, Time & Location: Woodmont Borough Hall, May 24, 2017, 7 PM

Participants Attending This Meeting *Please Print*	Representing:	Telephone:	E-Mail:
~~Tom Toiga~~		203-878-0357	TomToiga@AOL.com
JAY Dolores Hannon		203-877-4611	dolores hannon1@aol.com
Ed Bonessi		203-812-0014	ed.bonessi@hmhco.com
John Barrett	Borough of Woodmont	203 932-4601	seniorburgess@boroughofwoodmont.us
Joe McGarry	Self	203-874-7418	KWKSTP@optonline.net
Karen McGarry	"	" "	
Ken Jabo	Self	203-876-1445	kenjabo1274@gmail.com
Myrna Gans	"	" " "	myrnagans@gmail.com
Pamela Ayre		203-301-5496	pja4810@aol.com
Barbara G Orell	Self	(203) 878-6567	bgo54@aol.com
Grace Coggiullo	self	203-980-7499	gcc7fm@virginia.edu
Jill Dion	milford Mirror	203-907-5556	editor@milfordmirror.com
Steve Johnson	City OS	203 878 7812	stevenjohnson@ci.milford.ct.us
Phil Vetro	City of Milford Alderman	203 627-0313	nailbanger1969@yahoo.com
Dan German	114 Beach Ave.	2034448132	dgerms@aol.com

MINUTES FOR TWO (2) PUBLIC HEARINGS OF THE PLANNING AND ZONING BOARD HELD TUESDAY, 18 JULY 2017 AT 7:30 P.M. AT CITY HALL AUDITORIUM, 110 RIVER STREET

The meeting of the Planning and Zoning Board came to order at 7:31 p.m.

A. PLEDGE OF ALLEGIANCE AND MOMENT OF SILENCE

B. ROLL CALL

Members Present: Scott Marlow (Ch), Michael Dolan, John Grant, Carl S. Moore, Tom Nichol, Tom Panzella, Jim Quish, Rick Varrone
Not Present: Anthony Sutton (V-Ch), Richard Lutz
Staff: David Sulkis, City Planner; Meg Greene, Interim Board Clerk

C. PUBLIC HEARINGS – Close by 22 AUG 2017; Expires 21 SEP 2017

1. **73 MERWIN AVENUE (ZONE RMF-16)** Petition of Christopher Cody, Esq., for an amendment to a Special Permit and Site Plan Review to construct a patio on Map 59, Block 795, Parcel 56A1, of which Surf Village is the owner.

Attorney Cody, Cody and Gonillo, 185 Broad St., reviewed the original Special Permit as it pertained to the existing patio. He said the proposed patio would extend the current one. He distributed photos of the existing patio and a copy of the original Site Plan. He described the planned placement of the patio extension.

Board Discussion: The board did not have questions.

Chairman Marlow opened the hearing to the public with instructions.
Favor: Summarized below:
Attorney Cody submitted 2 emails of support and a petition with 28 signatures.
William Down, 40 Sandpiper Cres, expressed support as a member of the Surf Village Beach Club.
Joan Hoopes, 18 Sandpiper, expressed support as a member of the Surf Village Recreation Corporation.
Marilyn Kirchner, 41 Merwin Ave, also expressed support.
Opposed: None.

Mr. Marlow closed the public hearing.

Motion: Mr. Quish motioned to approve.
Second: Mr. Grant seconded.
Discussion: None.
Vote: Motion carried unanimously.

2. **150 BITTERSWEET AVENUE (ZONE R-5)** Petition of Cheryl Lacadie for Special Permit and Coastal Management Site Plan Review approval to construct a single family residence on Map 13, Block 133, Parcel 4, of which Chris Saley is the owner.

Mr. Quish recused himself.

Mr. Saley, 19 Marsh St., provided background, saying the old house was a 2-family, and that it had been demolished after Storm Sandy. **Mr. Sulkis** read a summary by ZEO Stephen Harris.

Board Discussion: **Mr. Grant** asked about paving materials for the driveway. **Mr. Saley** said the apron and an adjacent area would be covered in pavers not asphalt. **Mr. Grant** the dimensions of the patio and confirmed that the average grade for the site is about 8.8'.

AGENDA FOR TWO (2) PUBLIC HEARINGS PLANNING AND ZONING BOARD TO BE HELD TUESDAY, 18 JULY 2017, 7:30 PM, CITY HALL AUDITORIUM, 110 RIVER STREET

A. PLEDGE OF ALLEGIANCE AND MOMENT OF SILENCE
B. ROLL CALL
C. PUBLIC HEARINGS **Close by 22 AUG 2017; Expires 21 SEP 2017**

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D. NEW BUSINESS

1. **HAZARD MITIGATION UPDATE** - Informational presentation by Joseph Griffith, Director, DPLU, on the Hazard Mitigation Committee's role in protecting the life and property of Milford residents.

E. LIAISON REPORTS
F. REGULATION SUBCOMMITTEE – UPDATE
G. APPROVAL OF MINUTES 5 July 2017
H. CHAIR REPORT
I. STAFF REPORT
J. ADJOURNMENT

New Business, not on the Agenda, may be brought up by a 2/3 vote of those Members present and voting.

ANY INDIVIDUAL WITH A DISABILITY WHO NEEDS SPECIAL ASSISTANCE TO PARTICIPATE IN THE MEETING SHOULD CONTACT THE DIRECTOR OF COMMUNITY DEVELOPMENT, 783-3230, FIVE DAYS PRIOR TO THE MEETING, IF POSSIBLE.

City of Milford Walnut & Wildemere Beach

Meeting Sign-in Sheet

Project Name:	Walnut & Wildemere Beach Project	Project No:	

Meeting Title, Date, Time & Location: Pre Construction Meeting 7 PM, May 22, 2017

Participants Attending This Meeting *Please Print*	Representing:	Telephone:	E-Mail:
[illegible]	Heritage Sound	203-877-7086	
Norm Sylvain	Milford Beach	203-908-5919	
Louise Puzzo	Wildemere Beach Assoc	203 878-3322	lnweze@optonl.me.n
JOHN WILLIAMS	BEACH SHORE VILLAGE	203-783-0710	jgw315@aol.com
Diana Bytell	Self/walnut	203-525-7327	dianabytelle@yahoo.com
Kathryn McGorty	Wildemere Beach Assn	203-693-3846	Kathrynmcgorty@yahoo.com
Tina Pritchard	WPA	203-506-5402	cmpr.tch@optonline.net
Patricia Covino	Self/Walnut Beach	203 683 8444	PCovi2@earthlink.net
Peter Elman	self/walnut Beach	347-463-0678	Peterelman@icloud.com
Patricia Covino	Mother/walnut Beach	203683-8444	
Carol Romano	Wildemere	203 283 5379	romano05@Comcast.net
Tim Carroll	Self	203 641 6188	
Karen Falcone	Wildemere Beach	203 605 0678	KFalcone@Rwater.com
[illegible]	WALNUT BCH	203-704-1181	
[illegible]	WILDEMERE	203-907-5543	Pino@yahoo.com

NEW HAVEN

New

City Prepares For More Floods

by **THOMAS BREEN** | Jul 21, 2017 12:32 pm
Post a Comment | **E-mail the Author**
Posted to: **City Hall**, **Environment**, **Downtown**

THOMAS BREEN PHOTO

Water resources consultant Murphy with a FEMA Flood Insurance Rate Map (FIRM) of downtown New Haven.

Anticipating higher sea levels, harsher hurricanes, and more frequent floods in the not-too-distant future as a result of climate change, officials are embarking on an outreach campaign to inform residents in flood-prone neighborhoods about how best to protect themselves against the threat of rising water.

FEMA's National Flood Hazard Layer map of downtown New Haven. The areas in blue are classified by FEMA as a 1% annual chance flood hazard.

He referenced National Oceanic and Atmospheric Administration (NOAA) data showing that New Haven has experienced six floods in the last five years, including one conventional flood and two flash floods in May and June of 2014. Most of these recent floods have taken place downtown and on the Route 34 ramp.

According to NOAA, a conventional flood occurs when water overflows onto a normally dry land for a period of days or weeks, while a flash flood is caused by heavy rainfall over a period of hours.

He also noted that NOAA, the United States Geological Society (USGS), and the U.S. Army Corps of Engineers (USACE) estimate that relative sea level on the Connecticut coast is projected to rise one to eight feet above 2000 levels by 2100.

"When you hear about climate change and all the uncertainties," he said, "it's not uncertainty that it's happening. It's uncertainty of how exactly it's going to unfold."

They are also pointing residents to a 15 percent, nationally-subsidized discount on flood insurance that New Haveners are now eligible for thanks to the city's recent efforts to bolster and protect its floodplains.

The latest stop on the city's floodplain awareness tour came this past Tuesday night, as City Plan Department staffer Susmitha Attota and water resources planning consultant David Murphy presented background information and flood protection tips to the Downtown-Wooster Square Community Management Team (DWSCMT) during its regular monthly meeting at City Hall.

Attota and Murphy have made similar presentations to the Quinnipiac East and East Shore community management teams in recent months, and are planning upcoming presentations for residents of West River and Fair Haven.

"Who in this room has been going to the same part of the shoreline your whole life?" asked Murphy, who is the manager of water resources planning for the consultancy firm Milone & Macbroom, and has been working with the city to help develop its floodplain management plans and relevant community outreach.

"If you've fished from the same bridge, if you've lived near the same abutment, you've probably noticed that flooding is happening a little bit more every year."

This threat of rising sea levels and increased flooding has a very real cost. According to Murphy, the street damages, downed trees, and other wears on municipal infrastructure that resulted from Super-storm Sandy in 2012 cost the city well over $3 million to clean up. He estimates that 75 percent of those costs were reimbursed by the federal government.

Attota and Murphy did not show up to the meeting simply to warn of the dangerous reality of flooding and storm damage. They were also eager to talk about how the city has been working to protect its residents from flooding, particularly considering that 1,901 acres of city land (which is around 15 percent of the city's total square mileage) falls within what the Federal Emergency Management Administration (FEMA) calls special flood hazard areas, or 100-year flood zones.

Murphy cited five key strategies that the city uses to protect New Haven residents, property, and resources from flooding: public education, enforcing floodplain ordinances, stormwater and drainage system management, emergency management, and property protection. In practice, these strategies include everything from enforcing building code regulations and zoning ordinances for developments in floodplains, to making sure that the city's emergency notifications systems are up to date, to implementing 200 bioswales throughout the city by 2019.

Attendees at Tuesday night's DWSCMT meeting.

According to the city's latest Natural Hazard Mitigation Plan, which was approved by FEMA in April 2017 and which describes the city's plans for reducing long-term risks presented by flooding, hurricanes, earthquakes, and other natural disasters, the city has completed a number of capital projects since 2011 that directly address flooding hazards.

These include the cleaning of the Hemingway and Eastern Street culverts to reduce flooding during heavy rains, the design and construction of air conditioning and ancillary heating systems at four different fire stations, the repair of over 200 failed drainage structures throughout the city, and roof improvements for the Stetson library.

Furthermore, the city recently qualified to participate in the National Flood Insurance Program (NFIP) Community Rating System (CRS), which is a FEMA-run program that rewards communities that work to mitigate risks of flooding.

After a two-year-long application process, New Haven was approved in April 2016 as a Class 7 on the CRS rating scale, which, according to Attota, is the highest CRS status of any community in Connecticut. Thanks to this rating, New Haven residents can receive a 15% discount on NFIP flood insurance, which can cover up to $500,000 for commercial properties and up to $250,000 for residential properties.

She said that New Haven earned such a recognition from FEMA because of a variety of vigilant flood planning activities, including conducting public outreach on flooding, maintaining accurate record of elevation certificates that have been issued, and cleaning drainage catch basins regularly.

Murphy and Attota ended with suggestions on what residents can do to protect themselves and their properties from the risk of flooding. They encouraged residents to look up where their homes fall on FEMA's latest Flood Insurance Rate Maps; to keep property clean of lumber, waste, and other debris that could be turned into projectiles by a flood; to elevate buildings that do fall in floodplains; and to take basic personal safety precautions, like getting to higher ground and never driving through floodwaters, during a flooding hazard.

Attota.

"If you know your neighbors who are in flood-prone areas and do not think that they need flood insurance anymore," she continued, "I tell you this is not going to happen like it happened in the past. It's going to be more severe, and hurricanes are going to be stronger than they were before."

"We are committed to protecting the floodplains," Attota said. "We are ensuring that we don't overbuild in floodplains. We encourage property owners to take care of their own properties."

For more information information about flood risks and mitigation efforts in New Haven, visit http://www.cityofnewhaven.com/CityPlan/FloodInfo.asp or download the city's flood information brochure.

You must be logged in to comment

If you already have an account, please log in here | If not, please Register.

New

City Scores A "Perfect" Seven For Flood Preparedness

by **ALLAN APPEL** | Sep 26, 2017 6:09 pm
(3) Comments | **Post a Comment** | **E-mail the Author**
Posted to: **Environment**, **Morris Cove**

ALLAN APPEL PHOTO

New Brewery Square Seawall and Q River outlet pipe.

New Haven has built a lot of "green infrastructure," like those Lots of green infrastructure like bioswales that catch run-off. It is also monitoring the elevation of new buildings in flood plains.

Those were among the achievements that the Federal Emergency Management Agency (FEMA) noted when it awarded New Haven a top rating for the voluntary steps it has taken to prepare long term for sea rise, surges, flooding, and erosion.

Tuesday morning the mayor, city planners, and emergency preparedness officials gathered at the Pardee Seawall in Morris Cove to show off a certificate from FEMA and to celebrate a top Class Seven rating in the Community Rating System (CRS) program operated by FEMA's National Flood Insurance Program (NFIP).

Because of that rating, all homes and businesses in the 100-year flood plain "can get a 15 percent reduction in their flood insurance," reported Deputy Director of Emergency Operations Rick Fontana.

Only seven communities out of 65 participating in New England received a Class Seven rating. The only other in Connecticut is Stamford.

Zinn, Attota, Gilvarg, Harp, Fontana with the award.

About 1,800 parcels of land are in the flood plain—which can mean being riverine, coastal, or in a low lying area. Only about half of these have NFIP insurance currently, said Susmitha Attota, the city's outgoing assistant director of comprehensive planning.

Now the rest who do not have the insurance can contact their insurance agents, direct them to the flood maps on the City Plan website, and wait for that reduction.

"The city has completed a number of projects identified in its Hazard Mitigation Planning (HMP) to help prevent or mitigate localized flooding or erosion, including the Brewery Square Seawall, storm drain and catch basin cleaning, repair of the Long Wharf Storm Drain outfall, repair and replacement of tide flaps at other outfall locations and River Street coastal structures," said City Plan Director Karyn Gilvarg, who was also attending the ceremony.

Gilvarg and other officials present hailed a team effort involving city, state, and federal levels of government in the wake of Super Storm Sandy and Hurricane Irene to take steps — and then to painstakingly document them in FEMA's and the NFIP's CRS program — to make the city more resilient in future flooding emergencies.

The city's maritime life "is a cornerstone of its history and its Achilles heel," said Mayor Toni Harp.

She noted that 1,900 acres of city land are within the 100-year flood zone. "There is no such thing as being overly prepared," she said.

Pointing to the homes immediately facing the Pardee Seawall, Fontana estimated that at least 400 of them are in the flood plain and are now eligible for insurance reduction as a result of the city's rating.

"We were worried what could happen here after a heavy rain and surge, after Irene and Sandy," said Fontana. "We had pumps on Dean Street and we made sure those tide gates would work," he added.

The first of the city's 32 bioswales, at Trumbull and Whitney.

"I'm proud to have been part of this. It is a huge accomplishment. The area around Morris Cove, Long Wharf, Quinnipiac River, down by City Point are now better protected, " he said.

Officials said they did not want to rest on these laurels. "Now we have a responsibility to continue to enforce flood plain development permits given out by the buildings department and secure [more] grants to check out seawalls" and other projects, said Gilvarg.

Before Irene, the city fortified beach homes in Morris Cove with 70 truckoads of sand

"A large surge and rain event [combined] keep us up at night," said Zinn. He also said the need for long-term resiliency to keep up with the unpredictability of climate change is another sleep-depriver, along with how to find the right balance between deploying more hard or gray infrastructure, like sea-walls, and the green stuff, such as bioswales; the city has 32 of the latter.

When the NFIP re-evaluates its rating standards for cities in five years, New Haven will have a chance to score even better, which would mean a greater reduction for those who purchase flood insurance.

You must be logged in to comment

If you already have an account, please log in here | If not, please Register.

NORTH BRANFORD

PUBLIC MEETING SIGN-IN SHEET

Project: SCRCOG Multi-Jurisdiction Mitigation Plan	**Meeting Date:** 12-7-2017
Facilitator: Kurt A. Weiss, Town Engineer	**Place/Room:** North Branford Town Council Chambers

Name	City/Town of Residence	E-Mail
Edward F. Lawton III	Northford	elawton747@gmail.com
Edward F Lawton IV	Northford	edward.lawton@iHeartHomesRE.com
Alexander DeFrancesco	Northford	magnacarta88@gmail.com
George Miller	North Branford	george.northbranford@gmail.com
Donna Pursley	North Branford	dp5357@aol.com
Chris Kiernick	North Branford	
Virginia A Fallon	North Branford	Virginiafallon@gmail.com
Christine Lawton	Northford	christine.lawton@ihearthomesre.com

PUBLIC MEETING SIGN-IN SHEET

Project:	SCRCOG Multi-Jurisdiction Mitigation Plan	**Meeting Date:**	12-7-2017
Facilitator:	Kurt A. Weiss, Town Engineer	**Place/Room:**	North Branford Town Council Chambers

Name	City/Town of Residence	E-Mail
Carey Duguay	Madison CT	townplanner@townofnorthbranfordct.com
Bill Galdenzi	Northford, CT	bill.galdenzi@snet.net
Frances Lescovich	Northford CT	llamalady6@comcast.net
Tricia Mase	Northford, CT	trish1029@gmail.com
Janet Crean	Branford CT	jcrean1@yahoo.com

TOWN OF NORTH BRANFORD

TOWN HALL 909 FOXON ROAD NORTH BRANFORD, CONNECTICUT 06471-1290
Building Department (203) 484-6008 Engineering Department (203) 484-6009 Planning & Zoning (203) 484-6016
Department Fax (203) 484-6018

MEETING MINUTES OF REGULAR MEETING
NORTH BRANFORD PLANNING & ZONING COMMISSION

Thursday, December 7, 2017
7:00 p.m.
Town Hall - 909 Foxon Road

1. **CALL TO ORDER:** Acting Chairman Galdenzi called the meeting to order at 7:03 p.m.

2. **ROLL CALL:**
Harry Dulak, Chairman, absent
William Galdenzi, Member, Vice Chairman
Frances Lescovich, Member, Secretary
Ron Siena, Member, absent
Trish Mase, Alternate Member

3. **MINUTES** - Member Lescovich made a motion to approve the meeting minutes of November 16, 2017, seconded by Member Mase and passed.

4. **PUBLIC HEARING**
   A. **Disaster Planning for the Town of North Branford** presented by Kurt Weiss, Town Engineer

Town Engineer Weiss stated the purpose of the Hazard Mitigation Plan is to identify hazard issues and to implement actions that would reduce and eliminate long-term risk to people, property and resources from natural hazards. A public meeting is required for this mitigation plan so public comments can be incorporated into the plan. Mitigation plan goals are community planning, minimize flood hazards, limit the impact of fallen trees, regional collaboration and public awareness and preparedness. Jim Buck, Emergency Management Office for Town of North Branford, explained this is a five year process and the plan needs to be reviewed by the State and FEMA beginning in March 2018. Mr. Weiss encouraged people to go to the website and fill out the survey.

No public comments

   B. **Appl. #2017-11, Text Amendment** to allow in residential zones by Special Use Permit Farm Breweries, which includes manufacturing and brewing of beer, retail

TOWN OF NORTH BRANFORD

TOWN HALL 909 FOXON ROAD NORTH BRANFORD, CONNECTICUT 06471-1299
Building Department (203) 484-6008 Engineering Department (203) 484-6009 Planning & Zoning (203) 484-6010
Department Fax (203) 484-6018

AGENDA
REGULAR MEETING
NORTH BRANFORD PLANNING & ZONING COMMISSION
Thursday, December 7, 2017
7:00 p.m.
Town Hall - 909 Foxon Road

1. **CALL TO ORDER**
2. **ROLL CALL**
3. **MINUTES** - Meeting of November 16, 2017
4. **PUBLIC HEARING**
   A. **Disaster Planning for the Town of North Branford** presented by Kurt Weiss, Town Engineer

   B. **Appl. #2017-11, Text Amendment** to allow in residential zones by Special Use Permit Farm Breweries, which includes manufacturing and brewing of beer, retail sale of beer, associated tasting room and events, and consumption of beer on the premises of a compliant farm location. ***Owner/Applicant: Alexander DeFrancesco*** *(Application received October 19, 2017; Public hearing opened November 16, 2017)*

   C. **Application #2017-14, Text Amendment** to amend zoning regulations to allow for residential units above businesses in B-1 zone with a minimum lot area per multiple dwelling unit of 10,000 sq ft and a requirement of a minimum of 800 sq ft of floor area on the ground floor for each dwelling unit and a minimum size requirement of 600 sq ft for each dwelling unit. ***Applicant: The North Branford Planning and Zoning Commission*** *(Application received November 2, 2017)*

5. **POSSIBLE ACTION**
   A. **Appl. #2017-11, Text Amendment** regarding Farm Breweries
   B. **Appl. #2017-14, Text Amendment** regarding dwelling units in Business Zones

6. **NEW BUSINESS**
   A. **PZC Appl. #2017-13** Proposed 3 lot subdivision at **48 Tommy's Path** (Map 58 Lot 18) R-40 Zone. ***Applicant: iHeart Homes LLC; Owner: Louise Sansevero*** *(Received November 16, 2017)*

NORTH HAVEN

North Haven's Public Meeting is included in the Regional Public Meeting above.

ORANGE

Town of Orange, Connecticut

TOWN HALL
617 ORANGE CENTER ROAD
ORANGE, CONNECTICUT 06477-2499

PHONE: (203) 891-4730
FAX: (203) 891-2185
www.orange-ct.gov

Public Hearing on Hazard Mitigation

ORANGE, CONN.
TOWN CLERK'S OFFICE
RECEIVED FOR RECORDS
2018 MAR 13 AM 10:45
TOWN CLERK

Will be held in the town Hall basement Meeting Room on March 23, 2018 at 9:00am

Town of Orange, Connecticut

TOWN HALL
617 ORANGE CENTER ROAD
ORANGE, CONNECTICUT 06477-2499

PHONE: (203) 891-4730
FAX: (203) 891-2185
www.orange-ct.gov

Town Of Orange:

Public Hearing on Hazard Mitigation March 23, 2018 at 9:00am Meeting Minutes:

Emergency Management Advisory Council (EMAC) attendees:

Fred Palmer, Tino Russo, Joan Cretella, Robert Gagne, Tim Smith and Jim White.

Public Hearing Attendees: See Attendance Sheet attached.

Hearing called to order By Fred Palmer (Emergency Management Director) at 9:10 am.

The purpose of this hearing is to allow Public comments on the Hazard Mitigation Plan. The document was prepared in cooperation with the South Central Regional Council of Governments (SCRCOG).

Tino Russo (Asst. Emergency Management Director) presented a slide show of the proposed Hazard Mitigation Plan. See paper copy attached.

Members of EMAC discussed the document and decided to allow members to provide additional items to be mitigated within two weeks.

No Public Comments.

9:25 am: A motion was made to adjourn the Hearing, seconded and all were in favor.

Submitted By,

_____

Fred Palmer

TOWN CLERK

2018 MAR 29 PM 4:02

ORANGE, CONN
TOWN CLERK'S OFFICE
RECEIVED FOR RECORDS

LOCAL EMERGENCY PLANNING COMMITTEE MEETING
Tuesday December 5, 2017
Sign in Sheet

Print Name	Signature	Dept. / Company	Phone	Phone	Email
Joan Stave	Joan M Stave	Mayors Office	203-294-2070		
Chris Pisani		Wlfd Housing Authority	203-269-5173		
MARC DEPTULA		BOE	203-627-3589		Mdeptula@wallingfordpublicschools.org
David Bryant		BOE	203-949-6508		dbryant@wallingfordpublicschools.org
Ian Feeney		Nucor steel CT	203-213-3707		Ian.Feeney@nucor.com
Randy Chamberland		Rowland Technologies	203-758-9500	XT 150	Richamberland@Rowtec.com
Jeff Flynn		BYK USA	203-530-3465	2033033188	jeff.flynn@altana.com
Matt Chrubini		BYK USA	203-623-4385		matthew.chrubini@altana.com
Craig Stegmaier		Midstate Hospital	860-490-3528	860-224-5444	craig.stegmaier@hhchealth.org

Local Emergency Planning Commitee
2017 Sign in Sheet

COMPANY	LAST NAME	RST NAM	PHONE	PHONE	EMAIL	hazard b	Signature
Allnex USA Inc.	Polnar	Doug	(203) 284-4303	(203) 464-7371	doug.polnar@allnex.com	Y	
Allnex USA Inc.	Dichristina	Frank	(203) 284-4268	(203) 278-6509	frank.dichristina@allnex.com	Y	
Ametek	Szymczak	Eric	(203) 265-6731 ext. 806	(203) 631-8686	eric.szymczak@ametek.com	Y	
Ametek	Kowalczyk	Robert	(203) 265-6731 ext. 837	(203) 317-0443	Rob.Kowalczyk@ametek.com	Y	
American Red Cross	Parker	Susan	(860) 250-5555		susan.parker@redcross.org	Y	
AT&T			1 (800) 566-9347			Y	
Bristol-Myers Squibb	Michaels	David	(203) 677-7635	(203) 677-3333	david.michaels@bms.com	Y	
BYK	Ogle	Edward	(203) 305-2075		Edward.ogle@altana.com	Y	See updated sign in sheet
BYK	O'Grady	Joseph	(203) 678-7321	(203) 645-3490	joseph.ogrady@altana.com	Y	see updated sign in sheet
Comcast	Bairos	John	(860) 505-3349	(203) 410-7915	John_Bairos@cable.comcast.com		
Comcast	Glanville	Daniel	(413) 730-4571	(617) 279-1146	Dan_Glanville@cable.comcast.com		
Comcast	Smith	Tom	(508) 543-9022 ext. 37827	(617) 279-9019	Thomas_Smith2@cable.comcast.com		
~~Evonick~~ Cyro, LLC Evonik	~~Stein~~ Schiers	~~Peter~~ Joe	(203) 303-~~3417~~ 2431	~~(203) 804-4601~~	peter.stein@evonik.com joseph.schiers@evonik.com	Y	
~~Evonick~~ Cyro, LLC Evonik	Rodriguez	David	(203) 303-3416		david.rodriguez@evonik.com	Y	
Gaylord Hospital	Holland	Stephen	(203) 284-2800 ext. 3302		sholland@gaylord.org		
Gaylord Hospital	Vere	Mark	(203) 741-3434	(203) 671-8114	mvere@gaylord.org	Y	
Gaylord Hospital	DeBaise	Roger	(203) 741-3429	(203) 974-9331	rdebaise@gaylord.org	Y	
Hunter's Ambulance Service	McGovern	Bill	(203) 514-5134	(203) 537-6177	billm@huntersamb.com	Y	
LS Power/ Wallingford Energy	Chubet	Nathan	(203) 530-5695		nathan.chubet@ethosenergygroup.com	Y	
Masonic Care	Dadlani	William	(203) 584-2038		bdadlani@masonicare.org	Y	
Masonicare Chief Operating Officer	Garilli	Mark	(203) 889-6197	O (203)678-7831	mgarilli@masonicare.org		
Midstate Medical Center	McGaughan	Susan	(203) 694-5768	(203) 537-2676	sue.mcgaughan@hhchealth.org	Y	
Midstate Medical Center	Holzmiller	Augie	(203) 694-8067	(203) 537-2032	august.holzmiller@hhchealth.org	Y	Please Remove As Lawyer employed
Nucor, CT	Garner	David	(203) 949-6874	(203) 710-4376	david.garner@nucor.com	Y	
Program Planning	Roe	Donald	(203) 294-2060		towngov@wallingfordct.gov	Y	
Quinnipiac Valley Center	Smith	Clay	(203) 265-6771 ext. 2029	(203) 804-6404	ccsct203@aol.com		
Regency House	Bond	David	(203) 265-1661	860-729-8147	dbond@nathealthcare.com	Y	
Regency House	~~Nutcher~~ Mottle	~~Roger~~ Jason	(203) 265-1661	~~(203) 804-9163~~	~~rnutcher~~@nathealthcare.com	Y	Jason Mottle
SCOW	Harlow	Maria	(203) 265-5866	(203) 710-2665	mharlow@scowinc.org	Y	
Skyview Center	Turner	Jeffrey	(203) 265-0981	(860) 380-0336	jeff.turner@genesishcc.com	Y	
Skyview Center	Bryant	Bill	(203) 265-0981	(203) 600-8919	william.bryant@genesishcc.com	Y	PM.
3M/Health Information	Storey	Brett	(203) 949-6636	(203) 280-2470	bstorey@mmm.com	Y	

jmotta

Local Emergency Planning Commitee
2017 Sign in Sheet

Thurston Foods	Thurston	Robert	(203) 265-1525 ext. 149	(203) 415-7029	bobt@thurstonfoods.com	Y	
Thurston Foods	Jakiela	Larry	(203) 265-1525 ext. 119		larry@thurstonfoods.com	Y	
Ulbrich Steel	DeFelice	Debra	(203) 265-8299	(203) 269-2507	ddefelice@ulbrich.com	N	
Wallingford Animal Control	Ehlers	Katie	(203) 294-2180	(203) 294-2800	katie.leah.ehlers@gmail.com	Y	
Wallingford Board of Education	Menzo	Sal	(203) 949-6509	(860) 966-4627	smenzo@wallingfordschools.org	Y	
Wallingford Electric Division		Rick	(203) 294-2265	(203) 530-6728	r.hendershot@wallingfordct.gov	Y	
Wallingford Emergency Management	Heidgerd	Rich	(203) 294-2010	(203) 410-2728	rheidgerd@wallingfordfd.com	N	
Wallingford Fire Deputy Chief	Czentnar	Joseph	(203) 294-2730	(203) 410-2789	jczentnar@wallingfordfd.com	Y	
Wallingford Fire Chief	Heidgerd	Rich	(203) 294-2730	(203) 410-2728	rheidgerd@wallingfordfd.com	Y	
Wallingford Fire Marshal	Gudelski	Michael	(203) 294-2766	(203) 506-0196	mgudelski@wallingfordfd.com		
Wallingford Fire Marshal	Schock	Brian	(203) 294-2766	(203) 214-2477	bschock@wallingfordfd.com	Y	
Wallingford Health Department	Hazelwood	Eloise	(203) 294-2065	(203) 815-6152	health@wallingfordct.gov	Y	
Wallingford Health Department	~~Herbette~~	~~Stacey~~	~~(203) 294-2065~~	~~(203) 606-3585~~	~~health06492@gmail.com~~		
Wallingford Health Department	Civitelli	Steve	(203) 265-2065	(203) 687-8475	sanitarian@wallingfordct.gov		
Wallingford Housing Authority	McDermott	Kelly	(203) 269-5173 ext. 307	(860) 966-1648	kmcdermott@wallingfordha.com	Y	
Wallingford Mayor	Dickinson	William	(203) 294-2070			Y	
Wallingford OEM	Guercia	Leonard	(860) 471-1455		len@guerciagroup.com	Y	
Wallingford Police Chief	Wright	William	(203) 294-2828	(203) 535-5791	wwright@wallingfordpd.org	Y	
Wallingford Police Deputy Chief	Mikulski	Marc	(203) 294-2828	(203) 848-5851	mmikulski@wallingfordpd.org	Y	
Wallingford Public Utilities	Hendershot	Rick	(203) 284-4016	(203) 265-5055	~~geor~~rrandair@wallingfordct.gov	Y	
Wallingford Public Works	McCully	Henry	(203) 294-2105	(203) 294-2800	publicworks@wallingfordct.gov	Y	
Wallingford Public Works	Palermo	Steve	(203) 294-2105	(203) 294-2800	publicworks@wallingfordct.gov	Y	
Wallingford Senior Center	Viola	William	(203) 265-7753	(203) 843-5880	bviola@wlfdseniorctr.com	Y	
Wallingford Water Department	Vanski	Rick	(203) 949-2666	(203) 265-5055	rvanski@aol.com	Y	

r. hendershot

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Public / Legal Notices

PUBLIC NOTICE - WALLINGFORD, CT
Local Emergency Planning Committee
Annual meeting - December 5, 2017 - 9:00 A.M.
Central Fire Headquarters - 75 Masonic Ave.,
Disaster Planning Public Meeting
December 5, 2017 - 9:00 A.M.
Immediately following LEPC Meeting
Central Fire Headquarters - 75 Masonic Ave.,
William W. Dickinson, Jr., Chairman LEPC
17243

Help Wanted

Palumbo Trucking is looking for:

- Experienced Class A CDL tractor trailer drivers, willing to learn a new skill, operating pneumatic tanks.
- Qualified Diesel Mechanics 1st, 2nd & 3rd shift.
- Person to wash trucks & trailers, 4 days/wk, Wed-Sat.

Have a career with a family owned and operated company just outside of New Haven. Serious inquiries Only.

Please call (203) 484-9793 or visit our website at palumbotruckingct.com to fill out application.

DRIVERS NEEDED
Drivers needed for busy NAPA Auto Parts store, FT/PT, clean driving record. Apply in person to Chris or Don at 25 Jinny Hill Rd., Cheshire or call 203-272-3704 AM only, wkdys M-F.

Welcome to CLASSIFIED

Help Wanted

Entry Level CS Reps Wanted
Team player, willing to learn, training provided, Call today
203-234-0040

NAPA AUTO PARTS
stockroom person needed, freight check-in,counter trainee, driver. Clean driving record req. Great opportunity. Call Don 203-272-3704AM only M-F

Wanted roofers, siders, carpenters, plumbers, laborers, secretaries and Masons. Call 203-235-5944.

Apartments For Rent

BERLIN - Charming 2BR, 3rd floor, near CCSU, off st. park, appls, front/rear porch. $975. 203-915-7809.

MERIDEN - 1 bedroom, 1st floor, $675, tenants pay utilities, no pets, 80 Pleasant St., 203-688-6068.

MERIDEN - 2 Bedrooms, with sunny parlor, dining room, kitchen, bath, food storage room, and porch. Off street parking, 2nd fl., very desireable, no pets or smkg. $75/mo. + sec. 1 yr. lease, cr. chk., 203-605-8348

MERIDEN-2BRs, 5 rms., 3rd flr., appls., new win., hdwd firs. & gas furn., prkg, no pets, $800. 860-276-0552.

Apartments For Rent

Meriden
3rd Fl, 1 BR. No pets. Off street parking. $700 / mo. + sec. dep.. Call: 203-980-7433

SPECIAL - 1 BD apartments $800 /mo. Free Heat, Hot Water & Elec. Ask about our pet policy. Newly renovated! Sec. dep. req. (203) 639-4866

WLFD-Centally located 2nd fl, 2 BD, carpeting, front & back porches, hkups, basement, gas heat, stove/refrig, no pets, sec. $885.00 860-575-4915

WLFRD - 3 BR apt. in old country farm house, 1200 sqft. $1200, 1st, last 1 mo. sec. 860.719.3863.

Houses For Sale

BERLIN - New home, quality blt., sunny open floor plan, 3BR, $439,900. For sale by owner, BARONI & SONS CONSTRUCTION, 860-225-2528.

Love it ... List it
Place your ad today, call 203-238-1953.

Lots and Acreage

WATERBURY - Vacant lot, 55 Brewster st, 82 ft x 144 ft., (.02 acres), (3) Multi, Price $15,000 917-860-3856

Mobile Homes For Sale

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2 BR, 1.5 BA
$70,000
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Rooms For Rent

MERIDEN- Clean, Safe Room, 203-605-6522 Utils & fridge incl. Share kitchen/bath. $120 per week + sec.

WLFD -BR, private BA & entrance, util inc., no pets/smkg,cable tv, internet inc. $175.wk + 4 wks sec.203-980-1441

Wanted To Rent

Wanted garage with electricity in Southington area from December first to April first to store a sports car for the winter. Please call 860-621-2685

Appliances

AFFORDABLE - Used Dryers, washers, fridges, stoves, repairs available. Wallingford. 475-201-9001.

Furniture & Appliances

MERIDEN - Hutch - $75. Matching set of end tables, coffee table & sofa table - $120. All in excellent condition! Call - 203-237-9159

Lawn and Garden

VERY NICE SCREENED TOPSOIL
$22/yard delivered, 3 yd, $100 min. delivery Call Jim 860-982-4819

Miscellaneous For Sale

2 PERSON PLOT IN WALNUT GROVE CEMETERY (90A; Sec 27) $1,825.00. Please call 978-808-5541

Artificial Christmas tree lighted with stand. Good condition, $10. 203-237-1584

FOR SALE- Two pairs new adult snow shoes $20.00 per pair. Please call 203-235-5411

Free queen size mattress, box spring, new condition. Call 203-317-8160

SOUTHINGTON - Baldwin Piano for sale, great condition. Pick up is required, $350. Cathy - 860-919-2196

Music Instruments & Instruction

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Perform + Instruct
Voice lessons - all ages +levels,piano beginner-interm. (203) 630-9298.

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203-494-1695
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203-237-6575

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OFFICE OF THE MAYOR
TOWN OF WALLINGFORD
CONNECTICUT

WILLIAM W. DICKINSON, JR.
MAYOR

45 SOUTH MAIN STREET
WALLINGFORD, CT 06492
TELEPHONE 203 294-2070
FAX 203 294-2073

November 6, 2017

TO: Local Emergency Planning Committee/
Disaster Planning Public Meeting

FROM: Mayor William W. Dickinson, Jr.

RE: **Notice of Public Meetings - December 5, 2017 – 9:00 a.m.**
Central Fire Headquarters – 75 Masonic Avenue, Wallingford

The **Local Emergency Planning Committee** will be holding its next public meeting on Tuesday, December 5, 2017 at 9:00 a.m. at Central Fire Headquarters, 75 Masonic Avenue, Wallingford, to review the Local Emergency Operations Plan. The Plan has been updated to comply with both the Federal SARA Title III regulations for hazardous materials and the Connecticut Statues for Emergency Management.

Immediately following the LEPC meeting, a **Disaster Planning Public Meeting** will be held. This plan will help identify ways to lessen the impacts of natural hazards such as hurricanes, floods and severe winter weather. The contents of the plan will be introduced and members of the public will have the opportunity to discuss ideas regarding risk reduction.

You are being invited because of you or your employers' past involvement on the LEPC. Several new members that represent at risk populations in the Town have also been invited to strengthen the Town's emergency planning process.

Please confirm your attendance by calling my office at 203-294-2070. Thank you.

jms

WEST HAVEN

PUBLIC MEETING SIGN-IN SHEET

Project:	SCRCOG Multi-Jurisdiction Mitigation Plan	**Meeting Date:**	11/14/2017
Facilitator:	Abdul Quader	**Place/Room:**	CITY HALL

Name	City/Town of Residence	E-Mail
Richard Hebert	WEST HAVEN	RichardHebert4@comcast.net
Patricia Bollettieri	West Haven	patb05050@sbcglobal.net
Erin Eberhardt	West Haven	eeberhardt@icloud.com
Sammy Rivera	West Haven the Best!	budgetcarwash@aol.com
Mallery Rivera	West Haven	mallery842002@aol.com
Joseph Cole	West Haven	editor@whobserver.com
RICH STANDISH	WEST HAVEN	richardstandish@att.net
Greg Milano	West Haven	greegmmilano@gmail.com
Christopher Suggs	West Haven	Christopher.m.suggs@gmail.com
Mayor Ed O'Brien	WEST HAVEN	EOBRIEN@WESTHAVEN-CT.COM
Chair Steven R. Mullins	West Haven	SMullinsJPWH@aol.com
John Biancur	West Haven	johnbiancur@sbcglobal.net
Emilio Echevarria	West Haven	[illegible]
Catherine Connell	West Haven	Cconnell@westhaven-ct.gov

Public Meeting Slated For Regional Disaster Planning

The public is invited to participate in a meeting for the development of the South Central Region Multi-Jurisdiction Hazard Mitigation Plan.

By Vincent Salzo (Patch Staff) - Updated Oct 27, 2017 4:50 pm ET

Written by Michael P. Walsh

WEST HAVEN, CT — The public is invited to participate in a meeting for the development of the South Central Region Multi-Jurisdiction Hazard Mitigation Plan. West Haven, together with the South Central Regional Council of Governments and its municipalities, is helping to prepare an update to the plan, which aims to identify and assess natural hazard risks, such as flooding, hurricanes and winter storms, and to determine how to best minimize or manage those risks.

The public meeting is set for 7 p.m. Nov. 14 in the Harriet C. North Community Room on the second floor of City Hall, 355 Main St. Mayor Edward M. O'Brien, who serves as treasurer of SCRCOG's Executive Committee and sits on its Transportation and Emergency Management and Hazard Mitigation committees, said the plan is essential to the city's efforts in identifying ways to lessen the impacts of natural hazards.

As an officer and Executive Committee member, O'Brien helps steer planning initiatives for the region's 15 municipalities: Bethany, Branford, East Haven, Guilford, Hamden, Madison, Meriden, Milford, New Haven, North Branford, North Haven, Orange, Wallingford, West Haven and Woodbridge.

During the public meeting, City Engineer Abdul Quadir will introduce the plan's contents through a PowerPoint presentation. Residents will then have the opportunity to discuss ideas regarding risk reduction.

To help increase public participation, SCRCOG has launched the South Central Connecticut Hazard Mitigation Plan Survey, which gives everyone in the planning area a chance to share their opinions and participate in the mitigation planning process, said its executive director, Carl J. Amento.

Amento said the information gathered from the survey will help the planning team to better understand local concerns and issues as expressed by the region's residents. The information can also lead to mitigation activities that should help lessen the impacts of future disasters, he said.

The online survey, which takes about five minutes to complete, is available in English and Spanish at https://www.surveymonkey.com/r/CTMitigation.

To learn more about the regional disaster planning project, visit http://scrcog.org/regional-planning/regional-hazard-mitigation/.

SCRCOG, based at 127 Washington Ave. in North Haven, provides a platform for intermunicipal coordination, cooperation and decision-making. Since its inception in 1985, the planning organization, whose region covers about 570,000 people, has addressed numerous issues, including those related to housing, transportation, land use planning and economic development.

MINUTES
PLANNING AND ZONING COMMISSION
November 14, 2017

The West Haven Planning & Zoning Commission held a Public Hearing and Regular Meeting on Tuesday, November 14, 2017, in the Harriet North Room, 2nd Floor, City Hall, 355 Main Street, West Haven, CT at 7:00 P.M.

PRESENT: Commissioners Mullins, Biancur, Suggs, Standish, Encarnacion, Milano, Assistant City Planner Killeen, Commissioner of Planning and Development Riccio, ZEO Conniff and Mayor O'Brien. Absent was Commissioner Hendricks. In the Chairman's absence, Vice-Chairman Mullins chaired this meeting.

PLEDGE OF ALLEGIANCE

APPROVAL OF MINUTES: Commissioner Suggs made a motion to approve the meeting minutes for October 10, 2017, seconded by Commissioner Milano and passed.

Public Hearing
Proposed Regional Hazard Mitigation Plan, South Central Regional Council of Governments (RPA). The RPA is proposing an update to the Regional Hazard Mitigation Plan and is seeking public comments on proposed policies and recommendations for the region and for the City of West Haven. City Engineer Abdul Quadir was present to provide a PowerPoint presentation of the proposed plan, answer questions, and seek public input.

Mr. Quadhir stated every five years the mitigation plan must be updated, which is required by FEMA, and the City participates in the regional plan through the South Central Regional Council of Governments. The mitigation plan's purpose is to reduce and/or eliminate long-term risk to people and property from natural disasters, such as hurricanes and flooding. He described the six steps that will be followed to update this plan. The first step is the planning process, which is the step that they are in now. Plan goals include community planning, flood hazards, tree removal, regional collaboration with other cities and town and public awareness and preparation. He described the City's strategies that have been successful since the 1990's and future projects that are under consideration. Mr. Killeen asked Mr. Quadir to assure that the plan includes steps to develop a strategy for providing access and egress to Captain Thomas Boulevard and western sections of Beach Street during a 100-year storm event. Mr. Quadir is already working on plans for elevating the remainder of Beach Street. This additional step is important because the Planning and Zoning Commission recently adopted a Plan of Conservation and Development that calls for increased development and possibly higher residential densities in these areas. The CT DEEP has been reluctant to see more housing being built in the flood plains without having road access above the flood plain, even if development is elevated to be above the flood plain. Mr. Quadir also announced that there is a survey on the city's website for anyone who wishes to fill it out.

Three calls were made to the public for comments.

Erin Eberhart, Woodruff St., would like to know what the plan is for the entire shoreline strip in West Haven not just around Beach St. area.

Mr. Quadhir stated that the Plan is designed to look at the shoreline from Kimberly Avenue to the Milford City line. He noted that there is a recommendation to maintain and improve the seawall along the West Shore in the vicinity of Woodruff Street.

Commissioner Suggs made a motion to close the public hearing, seconded by Commissioner Biancur and passed.

Regular Meeting

1. **Comments on the Proposed Regional Hazard Mitigation Plan (Optional)** – No comments from the commission.

1. **Request for Reconsideration of Conditions for Budget Car Wash, 936 Boston Post Road (AKA 926 Orange Avenue) & 15 & 17 Everett Street.** (File # SP 17-03, SR 17-04, and CAL 17-05.)

   Sammy Rivera, 14 Hamilton St., owner of Budget Car Wash, distributed a pamphlet with photos of the property. Mr. Rivera stated that he is looking to expand the business and has improved his property as well as the area on Everett St. He is here for the commission to reconsider previous conditions that were part of the original approval. The first request is to eliminate the enclosure gates in front of the dumpster (condition # 6). Mr. Rivera stated that there is a big opening in front of the dumpster closure and installing gates would be very expensive. He also noted that the dumpster company would charge him more to remove trash if they had to open the gates each time they came. He also stated that the dumpster is fairly small, and his business is careful about maintaining this area. The second request was to remove the condition that vinyl slats be placed in the chain link fence along Everett Street. He explained that the fence is short and, once the slats were placed into the fence, there would be no screening of the car wash operation or even the dumpster. He also pointed out that the chain link fence is bent in some areas, so it would be difficult to install the slats and achieve the proper screening effect. The slats would also block the view of the plants and landscaping along the fence that were another condition of approval. Commissioner Biancur asked Mr. Rivera if it would help him comply with the condition for a complete enclosure around the dumpster if he had more time to install the gates. Mr. Rivera stated he would not be agreeable with this because these gates are a constant repair concern due to their size and tendency to sag over time. Mayor O'Brien agreed with the concern about sagging doors since he had experienced that when he was operating his business as well. Commissioner Mullins agrees with Mr. Rivera that it is an added unnecessary expense. Commissioner Standish stated he thinks the regulation should be enforced regarding the gates and asked Mr. Rivera if he was aware of the condition when he was approved. Mr. Rivera said that he learned about the condition during the public hearing and didn't have time to consider a response. ZEO Conniff then read into the record the section of the Zoning Regulations that requires an enclosure around dumpsters. Mr. Killeen commented that the Commission doesn't have the authority to grant a variance of the Zoning Regulations; it is something that would have to go before the Zoning Board of Appeals.

   Commissioner Biancur made a motion to extend the time period during which Budget Car Wash would have to comply with the regulation to fully enclose his dumpster, through to December 31, 2018, seconded by Commissioner Suggs and passed.

Disaster readiness is topic of hearing

By Michael P.Walsh
Special to the Voice

The public is invited to participate in a meeting for the development of the South Central Region Multi-Jurisdiction Hazard Mitigation Plan.

West Haven, together with the South Central Regional Council of Governments and its municipalities, is helping to prepare an update to the plan, which aims to identify and assess natural hazard risks, such as flooding, hurricanes and winter storms, and to determine how to best minimize or manage those risks.

The public meeting is set for 7 p.m. Nov. 14 in the Harriet C. North Community Room on the second floor of City Hall, 355 Main St.

Mayor Edward M. O'Brien, who serves as treasurer of SCRCOG's Executive Committee and sits on its Transportation and Emergency Management and Hazard Mitigation committees, said the plan is essential to the city's efforts in identifying ways to lessen the impacts of natural hazards.

As an officer and Executive Committee member, O'Brien helps steer planning initiatives for the region's 15 municipalities: Bethany, Branford, East Haven, Guilford, Hamden, Madison,

See Meeting, page 3

Meeting

Continued from page 2

Meriden, Milford, New Haven, North Branford, North Haven, Orange, Wallingford, West Haven and Woodbridge.

During the public meeting, City Engineer Abdul Quadir will introduce the plan's contents through a PowerPoint presentation. Residents will then have the opportunity to discuss ideas regarding risk reduction.

To help increase public participation, SCRCOG has launched the South Central Connecticut Hazard Mitigation Plan Survey, which gives everyone in the planning area a chance to share their opinions and participate in the mitigation planning process, said its executive director, Carl J. Amento.

Amento said the information gathered from the survey will help the planning team to better understand local concerns and issues as expressed by the region's residents. The information can also lead to mitigation activities that should help lessen the impacts of future disasters, he said.

The online survey, which takes about five minutes to complete, is available in English and Spanish athttps://www.surveymonkey.com/r/CTMitigation.

To learn more about the regional disaster planning project, visit http://scrcog.org/regional-planning/regional-hazard-mitigation/.

SCRCOG, based at 127 Washington Ave. in North Haven, provides a platform for intermunicipal coordination, cooperation and decision-making. Since its inception in 1985, the planning organization, whose region covers about 570,000 people, has addressed numerous issues, including those related to housing, transportation, land use planning and economic development.

WOODBRIDGE

PUBLIC MEETING SIGN-IN SHEET

Project:	SCRCOG Multi-Jurisdiction Mitigation Plan	**Meeting Date:**	December 5, 2017
Facilitator:	Woodbridge Public Works/DPW Director	**Place/Room:**	Room 16/Center Bldg.

Name	City/Town of Residence	E-Mail
Warren Connors	Woodbridge	wconnors@woodbridgect.org
Bettina Thiel		Woodbridge Town News

Woodbridge Town News

Council of Governments Works to Update Hazard Mitigation Plan

The South Central Regional Council of Governments, SCROG, is working to update a regional hazard mitigation plan, and is looking for public input. The purpose of the plan is "to identify and assess natural hazard risks, such as flooding, winter storms and hurricanes and determine how to best minimize or manage those risks," said Warren Connors, public works director and Woodbridge liaison on the planning team. "We want to mitigate future risk rather than today's," he said.

Natural hazards are events that threaten lives, property and other assets. The mission is to reduce or eliminate the risk to people and property. By adopting a long-term strategy the goal is to reduce disaster losses and break the cycle of disaster damage, reconstruction, and repeated damage. Once approved by the Federal Emergency Management Agency, FEMA, the plan will be a prerequisite for the municipalities to receive pre-disaster grant funding.

The SCRCOG has formed an advisory committee to help lead the planning, consisting of representatives from all 14 participating municipalities and other stakeholders. Connors serves as the local representative to that committee. He offered a public outreach session in early December, but there was no response from the public.

Fortunately, Woodbridge is located in a rather protected part of the state. It is far enough from the coast and the risk of earthquakes or tsunamis is rather small. Yet Woodbridge is flood prone from waterways such as the West River and the Wepawaug; and from wetlands in general. Damaging storms can cause loss of life and property. Falling trees damage the electric grid and during drought periods the trees could potentially constitute a significant fire hazard. Heavy winds associated with tropical storms or hurricanes have uprooted trees or caused them to crack or split, and in some cases have left a large portion of the state without power. A good number of households now have generators, Connors said.

By removing the Pond Lily Dam at the Woodbridge/Westville town line and by replacing the Merritt Avenue Bridge, the town has already scored a successful hazard removal campaign. The prediction is that the removal of impediments will allow the West River to run free in the confines of the river bed without flooding homes and businesses in that area. However, that has yet to be tested in hazardous weather conditions, Connors said.

Most Recent Issue

(https://woodbridgetownnews.com/december-15-2017/)

December 16, 2017
(https://woodbridgetownnews.com/december-16-2017/)

Advertising

Residents are invited to take a survey on the SCROG website either in English or in Spanish. The survey provides an opportunity for everyone in the planning area to share his or her opinions and participate in the mitigation planning process. The information provided will help the Advisory Committee to better understand local concerns and issues as expressed by citizens of the region, and can lead to mitigation activities. Questions range from regulatory approaches to personal hazard preparedness.

The survey can be accessed at http://www.surveymonkey.com/r/CTMitigation (http://www.surveymonkey.com/r/CTMitigation). Participating municipalities in addition to Woodbridge are Bethany, Branford, East Haven, Guilford, Hamden, Madison, Milford, New Haven, North Branford, North Haven, Orange, Wallingford and West Haven.

By Bettina Thiel – Woodbridge Town News Correspondent

FOUR By FOUR – A Tribute to the Legendary...

Woodbridge Center News 11/17/17

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November 17, 2017

Woodbridge Country Club Archives

Categories

JURISDICTION MEETINGS

INVITE AND AGENDA

Eugene Livshits <elivshits@scrcog.org> June 27, 2017 at 1:51 PM

To: abdul_quadir@cityofwesthaven.com <abdul_quadir@cityofwesthaven.com>, Anderson, David (andersond@madisonct.org) <andersond@madisonct.org>, Clark Hurlburt <clarkhurlburt@sbcglobal.net>, Donna Hall <dhall@newhavenct.net>, Fred Palmer <fcpalmer@juno.com>, Isabel Kearns (IKearns@Bethany-ct.com) <IKearns@Bethany-ct.com>, Janice Plaziak <jplaziak@branford-ct.gov>, Jonathan Bodwell <bodwell.jonathan@town.north-haven.ct.us>, Karyn Gilvarg (kgilvarg@newhavenct.net) <kgilvarg@newhavenct.net>, Kevin Magee <mageek@ci.guilford.ct.us>, Kevin White <eh.kwhite@gmail.com>, Kurt Weiss <townengineer@townofnorthbranfordct.com>, Mark Austin <maustin@hamden.com>, Matthew Marcarelli <mmarcarelli@easthavenfire.com>, Michael Ott (ottm@madisonct.org) <ottm@madisonct.org>, portleyJ@ci.guilford.ct.us <portleyJ@ci.guilford.ct.us>, Richard W. Heidgerd <rheidgerd@wallingfordfd.com>, Robert Hiza <rhiza@orange-ct.gov>, Susmitha Attota <SAttota@newhavenct.net>, Warren Connors <wconnors@woodbridgect.org>

Cc: Carl Amento <camento@scrcog.org>, Stephen Dudley <sdudley@scrcog.org>, Christopher Rappa <cjrappa@scrcog.org>, Rebecca Andreucci <randreucci@scrcog.org>, Jamie Caplan <jamie@jamiecaplan.com>

hide

SCRCOG HMP Update - Municipal Meetings

Dear Regional Hazard Mitigation Advisory Committee Representatives,

As part of the South Central Region: Multi-Jurisdiction Plan Update (HMP) planning process there will be a meeting within each of your respective municipalities.

In order to schedule the meetings please go to the following link: https://doodle.com/poll/2r38y9gns4zvxqf2 and fill out the doodle poll. If the options available do not work for you, please let me know and we can find an alternative time and date. Once I receive the responses, I will confirm the date, time and location of the meeting with you.

Please see the attached document for a potential list of stakeholders to invite to the meeting and HMP Update Fact Sheet. If you have any questions, please do not hesitate to contact me.

Sincerely,

Eugene

Eugene Livshits
Senior Regional Planner
South Central Regional Council of Governments
127 Washington Avenue, 4th Floor West
North Haven, CT 06473
(203) 466-8626

SCRCOG
SOUTH CENTRAL REGIONAL COUNCIL OF GOVERNMENTS
Planning for Our Region's Future

Bethany Branford East Haven Guilford Hamden Madison Meriden Milford
New Haven North Branford North Haven Orange Wallingford West Haven Woodbridge

Carl J. Amento, Executive Director

South Central Regional Multi-Jurisdiction
Hazard Mitigation Plan Update
AGENDA
Individual Municipality Meetings

1) Participant Introductions

2) Project Introduction

3) Purpose and Goals of Meeting
   a) Engage a diversity of stakeholders to capture current municipality information for the updated mitigation plan.

4) Update to Existing Conditions
   a) Any Changes to Local Capabilities
   b) Changes to Problem Statements
   c) Experiences/Lessons Learned Since Previous Plan Adopted
      i) Response to disasters since last 2014 (had one declared winter storm)

5) Progress Update on Local Mitigation Actions
   a) Status report for all previously identified mitigation actions
      i) Integration of Coastal Resilience Plan (if applicable)
   b) Progress with Hurricane Sandy Appropriations (CDBG-DR and FEMA HMA Grants)
   c) Status report on progress made toward integrating mitigation plan into other planning mechanisms
   d) Early ideas for new mitigation actions?

6) Public Participation and Next Steps
   a) Hazard Mitigation Plan Survey
   b) Municipality Meetings

For more information:
Eugene Livshits, Senior Regional Planner
203-466-8626
elivshits@scrcog.org
http://scrcog.org/regional-planning/regional-hazard-mitigation/

Bethany

MEETING SIGN-IN SHEET

Project:	SCRCOG Mitigation Plan Update	**Meeting Date:**	7/31/17
Facilitator:	Jamie Caplan/Eugene Livshits	**Place/Room:**	Town Hall

Name	Title	Organization or Company	Phone	E-Mail
Richard Cogill	Fire Chief	Bethany Fire Dept	203-954-8597	Chief@BethanyfireCT.com
Rod White	EMD	Town of Bethany	203-509-3809	firemarshal@bethany-CT.com
Clark Hurlburt	Selectman Dep EMD	Town of Bethany	203-444-4469	clarkhurlburt@sbcglobal.net
Alan Green	Director of Public Works	TOB	203-393-1555	agreen@bethany-CT.com
Derrylyn Gorski	First Selectman	TOB	203-393-2100	dgorski@bethany-ct.com
Isabel Kearns	Land-Use Admin.	TOB	same	Ikearns@Bethany-CT.com
David Merricm	Resident Trooper	TOB	203-393-2100	Trooper1@Bethany-CT.com

Branford

MEETING SIGN-IN SHEET

Project:	SCRCOG Mitigation Plan Update	**Meeting Date:**	7/27/17
Facilitator:	Jamie Caplan/Eugene Livshits	**Place/Room:**	Basement Conf. Rm

Name	Title	Organization or Company	Phone	E-Mail
Anthony Ciniciola	Building Official	Town of Branford	203-315-0674	aciniciola@branford-CT.gov
Brianna Weller	Preparedness Coord.	ESDHD	203-481-4233	bweller@esdhd.org
Debi Caron	Director of IT	Town of Branford	203 315 0617	dcaron@branford-ct.gov
Rebecca Andreucci	Regional Planner	SCRCOG	203.466-8601	randreucci@scrcog.org
Janice A Plaziak	Town Engineer	Branford	203-315-0606	jplaziak@branford-ct.gov
Eugene Livshits	Sr. Regional Planner	SCRCOG	203-466-8626	elivshits@scrcog.org
Raymond Dunbar	Captain P.D. EMS	Town of Branford	203 627-4345	rdunbar@branfordpolice.com
Jim Finch	Fin. Director	Town of Branford	203-315-0663	jfinch@branford-ct.gov
Hans Smith	Town Planner	"	(203) 488-1255	hsmith@branford-ct.gov

Name	Title	Organization or Company	Phone	E-Mail
JOHN HEFFERLE	ASST. TOWN ENGINEER	TOWN OF BRANFORD	203-315-0606	JHEFFERLE@BRANFORD-CT.GOV
Michael Pascucilla	Director of Health	East Shore District Health Dept	203-481-4233	mpascucilla@esdhd.org
OTTO BERGER	LEAD TRADESMAN	TOWN OF BRANFORD	203 627-3304	OBERGER@BRANFORD-CT.GOV
Tom Mahoney	Fire Chief	Town of Branford	(203) 996-5297	tmahoney@branfordfire.com

East Haven

MEETING SIGN-IN SHEET

Project:	SCRCOG Mitigation Plan Update	**Meeting Date:**	8/3/17
Facilitator:	Jamie Caplan/Eugene Livshits	**Place/Room:**	Public Works

Name	Title	Organization or Company	Phone	E-Mail
Eugene Livshits	Sr. Regional Planner	SCRCOG	203-466-8626	elivshits@scrcog.org
Rebecca Andreucci	Regional Planner	SCRCOG	203-466-8601	randreucci@scrcog.org
Jerry Tramontano	AA East Haven Engineering	Town of East Haven	203.468-3250	eh.tramontano@gmail.com
MATTHEW MARCARELLI	EMD FIRE CHIEF	"	203 468 3221 203 675 4067	mmarcarelli@eosthavenfire.com
Chris Soto	Planning & Zoning Administrator	Town of East Haven	203-468-3349	Eh.zoning@gmail.com.
Brianna Weller	Preparedness coord.	East Shore District Health	2034814233	bweller@esdhd.org

Guilford

MEETING SIGN-IN SHEET

Project:	SCRCOG Mitigation Plan Update	**Meeting Date:**	7/26/17
Facilitator:	Jamie Caplan/Eugene Livshits	**Place/Room:**	Fire Station

Name	Title	Organization or Company	Phone	E-Mail
Hank Gracey	gfd. Haz Mit		2034534773	hanklouise@comcast.net
Michael Shove	Assistant Chief	Guilford Fire	203-453-8056	mshove@guilfordfire.com
Tim Bernier	LT	Guilford Police	203-453-5039	bernier@ci.guilford.ct.us
John Thommen	chairman	Harbor management	203 3146918	jthommen@oceanmark.com
Chris Tietjen	HMC Commissioner	HMC	203-458-7000	ckth@att.net
Kevin Magee	Environmental Planner	Town of Guilford	203-453-8074	mageek@ci.guilford.ct.us
RUSSELL CAMPAIGNE	PLANNING COMM.	TOWN OF GUILFORD	203 453 1224	RC@CKC-ARCHITECTS.COM.
GEORGE KNAI	TOWN PLANNER	TOWN OF G/FD	203 453-8032	Knafg@ci.guilford.ct.us
BRIAN MCGLONE	ECONOMIC DEVELOPMENT	TOWN OF GFD	203-453-8071	mcgloneb@ci.guilford.ct.us

Name	Title	Organization or Company	Phone	E-Mail
MARK DAMIANI	ASSISTANT TOWN ENGINEER	TOWN OF GUILFORD	203-453-8029	damianim@ci.guilford.ct.us
Dennis Johnson	Director of Health	Town of Guilford	203-453-8036	johnsind@ci.guilford.CT.us
RICK MAYNARD	PARKS & RECREATION DIRECTOR	TOWN OF GUILFORD	(203) 453-8068	MAYNARDR@CI.GUILFORD.CT.US
Clifford Gunnham	Director of Facilities	BOE	203-458-0001	Gunnhame@guilfordschools.org.
JIM PORTLEY	TOWN ENGR & DIR OF P.W.	TOWN OF GUILFORD	203.453.8037	portleyj@ci.guilford.ct.us
Bernard Lombardi	Private Architect Chair Marina Commission		203 605 9820	B-Lombardi@Comcast.net Bernie@LombardiArchitect.com
Eugene Livshits	Sr. Regional Planner	SCRCOG	203-466-8626	elivshits@scrcog.org
Rebecca Andreucci	Regional Planner	SCRCOG	203.466.8601	randreucci@scrcog.org

Hamden

MEETING SIGN-IN SHEET

Project:	SCRCOG Mitigation Plan Update	**Meeting Date:**	8/23/17
Facilitator:	Jamie Caplan/Eugene Livshits	**Place/Room:**	3rd Flr Town Hall

Name	Title	Organization or Company	Phone	E-Mail
Kevin Samperi	Captain	Hamden Police	203 230-4000	Ksamperi@hamdenpd.com
Brian Dolan	Fire Marshal	Hamden Fire	203 407 3182	bdolan@hamden.com
Andrew Kinlock	GIS Coordinator	Engineering	203 287-7049	aKinlock@hamden.com
MATT DAVIS	Assistant Planner	P/Z	203 287-7077	m.davis@hamden.com
Brendan Sharkey	Asst Town Atty	Town Attorney's Office	203 287-7050	BSharker@Hamden.com
Holly Masi	Zoning Enforcement Officer	Planning & Zoning	203-287-7072	HMasi@Hamden.com [illegible]
ARTGiuliett	Risk Mgr	Finance	203-287-7008	agiulietti@hamden.com
Mike Siciliano	Assistant Director Public Works & Parks	Public Works	203-287-3600	msiciliano@hamden.com

Madison

MEETING SIGN-IN SHEET

Project:	SCRCOG Mitigation Plan Update	**Meeting Date:**	8/14/97
Facilitator:	Jamie Caplan/Eugene Livshits	**Place/Room:**	Town Hall

Name	Title	Organization or Company	Phone	E-Mail
Eugene Livshits	Sr. Regional Planner	SCRCOG	203-466-8626	elivshits@scrcog.org
Rebecca Andreucci	Regional Planner	SCRCOG	203-466-8601	randreucci@scrcog.org
David Anderson	Director of Planning & Economic Development	SCRCOG	203-245-5633	andersond@madisonct.org
Bill McMinn	Director of Facilities	Town of Madison (H) BOE	203 245 6470	mcminnwb@madisonct.org
Vin Garofalo	Building Official	T.O.M.	203 245-5699	GAROFALOVE MADISONCT.ORG
Sam DeBurra	Fire Marshal EMD	Town of Madison	203-245-5617	deburrase@madisonct.org
Bob Gilhuly	Deputy Fire Marshal DEMD	Madison	"	gilhulyr@madisonct.org
Arthur Sickle	Director of Admin. Services (Technology Dir.)	Town of Madison Madison Public Schools	203-245-6314	sicklea@madisonct.org
Chris Bernier	MADISON EMS EMS Director		(203) 245-9821	chris.bernier@madisonems.org
Bob Kuchta	INLAND WETLAND OFFICER / TREE WARDEN	Town of Madison	203 245-5630	KUCHTABE@MADISONCT.ORG

Name	Title	Organization or Company	Phone	E-Mail
Brianna Weller	Preparedness Coord.	ESDHD / Town of Madison	203 4814233	bweller@esdhd.org
JOHN DELAURA	TED	TOWN	203 245 5662	DELAURAJ@MADISONCT.ORG
Trent Joseph	Director of Health	Madison Health	203 245 5614	JosephT@madisonct.org

Milford

MEETING SIGN-IN SHEET

Project:	SCRCOG Mitigation Plan Update	**Meeting Date:**	8/2/17
Facilitator:	Jamie Caplan/Eugene Livshits	**Place/Room:**	Auditorium

Name	Title	Organization or Company	Phone	E-Mail
Jeff Wilson	Senior Business Unit Manager	Edgewell	203-882-2554	jeff.wilson@edgewell.com
BICC DISIERO	FACILITY MNGR.	CT POST MARCH	203.301.2241	BDISIERO@CENTENNIALREC.COM
Jessica Bates	Senior ENGINEER	BL COMPANIES	860-760-1517	Jbates@BLCompanies.COM
Michael Stein	Senior strategic account manager	UI	203-499-2027	michael.steinUInet.com
TheresA Covaleski	President ~~BHBA~~	Bayview Heights Beach Assoc-	2034467180	tecovaleski@yahoo.com
BRUCE KURYLA	HARBORMASTER	MHMC	203876-2670	BKURYLA@AOL.COM
STEVE FOURNIER	ASST MAYOR	MAYORS OFFICE	203 783-3201	FOURNIER@CI.MILFORD.CT.US
BILL RICHARDS	DEP. EMD	CITY	203-671-6661	WRichards@ci.milford.ct.us
Joe Dempsey	Officer	Police Dept.	203-874-2366	CSime1@

Name	Title	Organization or Company	Phone	E-Mail
MaryRose Palumbo	Inland wetland Agent	City of Milford	203-701-4452	MPalumbo@ci.milford.ct.us
Laura Miller	Chief, Environmental Health Division	City of Milford	203-783-3319	lmiller@ci.milford.ct.us
Pam Staneski	State Representative	State of CT	860-240-8700	pam.staneski@housegop.ct.gov
Chris Sdey	Director of Public Works	City of Milfo	203-209-4402	CSsley@ci.milford.ct.us
GREG PIPLUSKI	CITY ENGINEER	CITY OF MILFORD	203-783-3261	GPIPLUSKI@CI.MILFORD.CT.COM
Steve Johnson	Open Space & Nat. Resource Agent/ Acting Assist. Pw Dir.	City Milford	203-878-7812	~~Stevenjohnson~~ Stevenjohnson@ci.milford.ct.us.
Emily Scott	Disaster Recovery Consultant	City of Milford	203-783-3230	escott@ci.milford.ct.us

MEETING SIGN-IN SHEET New Haven

Project:	SCRCOG Mitigation Plan Update	**Meeting Date:**	7/25/17
Facilitator:	Jamie Caplan/Eugene Livshits	**Place/Room:**	Mayor's Conf. Rm 3

Name	Title	Organization or Company	Phone	E-Mail
Dawn Heming	Project Manager	CNH	203 946-8101	dheming@newhavenct.ga
Susmitha Attola	Asst. Dir. of comprehensive Planning	CONH	203-946-7814	sattola@newhavenct.gov
Michael Piscitelli	City d Newhaven Dept of DA	CNH	(203)946-2667	mpiscite@newhaven.gov
Rebecca Andreucci	Regional Planner	SCRCOG	(203) 466-8601	randreucci@scrcog.org
Rick Fontana	DEPUTY Director Emergency Ops	City of NH	203 410-0543	Rfontana@newhavenct.gov
Rebecca Bombero	Parks Director	CONH	203-946-6027	rbombero@newhavenct.gov

N. Branford

MEETING SIGN-IN SHEET

Project:	SCRCOG Mitigation Plan Update	**Meeting Date:**	8/2/17
Facilitator:	Jamie Caplan/Eugene Livshits	**Place/Room:**	Town Manager's Conf. Rm

Name	Title	Organization or Company	Phone	E-Mail
Mike Paulhus	Town Manager	N. B	203-484-6000	Townmanager@townofnorthbranfordct.com
Brianna Weller	Preparedness Coord.	East Shore Dist. Health	203 481 4233	bweller@esdhd.org
Rebecca Andreucci	Regional Planner	SCRCOG	203 466 8601	randreucci@scrcog.org
Anthony Esposito		NB	203 484 6002	finance director @ townof northbranfordct.com
Fran Nierola JR	Director of Public works	NB	203-484-6060	Public works Director @ Town of North Branford Ct. com
Kurt Weiss	Town Engineer	NB	203 484-6005	town engineer @ town of northbranfordct.com
James Buck	EMD	NB	203-484-2196	EMD @ town of northbranfordct.com

Town of North Haven

MEETING SIGN-IN SHEET

Project:	SCRCOG Mitigation Plan Update	**Meeting Date:**	7/27/17
Facilitator:	Jamie Caplan/Eugene Livshits	**Place/Room:**	2nd Flr Conf. Rm

Name	Title	Organization or Company	Phone	E-Mail
Rebecca Andreucci	Regional Planner	SCRCOG	203-466-8601	randreucci@scrcog.org
Eugene Livshits	Sr. Regional Planner	SCRCOG	203-466-8626	elivshits@scrcog.org
Jonathan Bodwell	Town Engineer	Town	203-239-5321 X 430	Bodwell.Jonathan@town.north-haven.ct.us
Thomas McLaughlin	Chief of Police	Town	203-5321 Ext 200	policechief@town.north-haven.ct.us
Paul Januszewski	Chief of Fire	Town	(203) 239-5321 Ext 100	firechief@town.north-haven.ct.us
Gary Johns	Assessor	Town	203 239 5321	johns.gary@northhaven-ct.gov
Mark Barrows	Manager WPCF	Town	203-234-2170	mark.barrows@veolia.com
Dave Marcarelli	Dep Fire Chief	Town North Haven	239-5321 ext 100	deputychief@town.north-haven.ct.us
Lynn Sadosky	Director of Public Works	North Haven	203-239-5321, ext. 401	sadosky.lynn@town.north-haven.ct.us

Orange

MEETING SIGN-IN SHEET

Project:	SCRCOG Mitigation Plan Update	**Meeting Date:**	10/4/17
Facilitator:	Jamie Caplan/Eugene Livshits	**Place/Room:**	Orange Town Hall

Name	Title	Organization or Company	Phone	E-Mail
☆ Tino Russo	Deputy Dir. Emergency Mgmt	Town of Orange	203.605-1468	trusso@orange-ct.gov
Tim Smith	Fire Marshal	Town of Orange	203.891.4709	tsmith@orange-ct.gov
Robert Gagne	Chief of Police	Town of Orange	203-891-2136	rgagne@orange-ct.gov
Max Martins	Admin. LT.	Town of Orange	203-891-2136	mmartins@orange-ct.gov
Paul DiNice	Zoning Admin. + Enforcement Officer	Town of Orange	203 891-4743	pdinice@orange-ct.gov
Eugene Livshits		SCRCOG		

~~Page 1 of 3~~

Wallingford

Meeting Sign-In Sheet

Project:	SCRCOG Mitigation Plan Update	**Meeting Date:**	8/3/17
Facilitator:	Jamie Caplan/Eugene Livshits	**Place/Room:**	Fire House

Name	Title	Organization or Company	Phone	E-Mail
John Gawlak	Director Parks & Recreation	Town of Wallingford	203-294-2120	parksrec@wallingfordct.gov
Jeff Franson	Supt. Electric Division	Town of Wallingford	203-294-2273	J.Franson@Wallingfordct.gov
Bill Wright	PD	"	203-294-2828	wwright@wallingfordpd.org
Kurt V. Treiber	Risk Management	Town of Wallingford	203-294-2130	risk@wallingfordct.gov
Joe Czentnar	Deputy Fire Chief	Wallingford FD	203-294-2730	jczentnar@wallingfordfd.com
W Dickinson	Mayor	Wlfd	203 294 2070	
Joan Slave	Adm Aide	T of Wlfd	203-294-2070	
Vernon Grant	Director	Ashlar Village Masonic	203 679 6068	[illegible]
David Crowell	Dir Corporate Supp Svs	Masonicare	203-678-7828	dcrowell@masonicare.org

Page 1 of 3

Name	Title	Organization or Company	Phone	E-Mail
ROGER DEBAISE	ENVIRONMENT of CARE / BIOMED	GAYLORD HOSPITAL	979 9743 741 3429 203 ~~741 9471~~	rdebaise@gaylord.org
Tim Polaske	Facilities	Gaylord Hospital	203 741 3435	Tpolaske@gaylord.org
Leonard Guerra	Deputy EMD	Town of Wallingford	860-471-1455	len@guerragroup.com
Richard Heidgerd	Fire Chief - EMD	Town of Wallingford	203 294-2730	rheidgerd@wallingfordFD.com
Henry McCully	NR. P.W.D.	TOWN of WLFD	203-294-2105	
NEIL AMWAKE	GENERAL MANAGER, WATER AND SEWER DIVISIONS	TOWN OF WALLINGFORD	203 949-2670	NEIL.AMWAKE@WALLINGFORDCT.GOV
Michael Klimaszewski	manger of Grounds + HazMat	Choate Rosemary Hall	203-697-2202	MKlimaszewski@choate.edu
Risa Vine	Director of Risk Management	Choate	203-697-2988	rvine@choate.edu
Rebecca Andreucci	Regional Planner	SCRCOG	203-466-8601	randreucci@scrcog.org

West Haven

MEETING SIGN-IN SHEET

Project:	SCRCOG Mitigation Plan Update	**Meeting Date:**	7/25/17
Facilitator:	Jamie Caplan/Eugene Livshits	**Place/Room:**	3rd Flr Conf. Rm

Name	Title	Organization or Company	Phone	E-Mail
Scott Dilley	Emergency Mang.	VACT	203-932-5711 X8127 cell: 203-752-6393	Scott.Dilley@VA.gov
Louis Annino	AVP for Facilities	Univ. of New Haven	(203)932-7153 (203) 627-3573	lannino@newhaven.edu
Chris Reed	Director of Safety	Univ. of New Haven	203-932-7010 475-355-0801	creed@newhaven.edu
Bill Slater	Director Parks & Recreation	City of West Haven	w) 203-937-3651 (c) 203-537-0916	bill_slater@cityofwesthaven.com
Scott Schwartz	EMD	City of West Haven	203 627-7914	chiefSchwartz@sbcglobal.net.
Eileen Krugel	Grant Writer	City of WH	203-937-3620	ekrugel@westhaven-ct.gov
Maureen Lillis	Director of Health	City of WH	203 937-3660	mlillis@westhaven-ct.gov
Michael Esposito	D/C ~~CWHFD~~	CWHFD	203 933-2541	mesposito@CityofWestHavenFD.org
Abdul Quadri	city Engineer	City West Haven	203-937-3577	quadri@westhaven-ct.gov

Name	Title	Organization or Company	Phone	E-Mail
Rebecca Andreucci	Regional Planner	SCRCOG	203-466-8601	randreucci@scrcog.org
Dave Killeen	ASST. CITY PLANNER	CITY OF WEST HAVEN	203-937-3500 EXT 3007	DKilleen@westhaven-CT.gov
Lloyd Adams	Asst Building Official	City of West Haven	203-937-3598	ladams@westhaven-ct.gov

Woodbridge

MEETING SIGN-IN SHEET

Project:	SCRCOG Mitigation Plan Update	**Meeting Date:**	7/31/17
Facilitator:	Jamie Caplan/Eugene Livshits	**Place/Room:**	DPW 15 Meetinghouse Ln

Name	Title	Organization or Company	Phone	E-Mail
Eugene Livshits	Sr. Regional Planner	SCRCOG	203-466-8626	elivshits@scrcog.org
Kelly Hammill	Office Mgr.	Town of Woodbridge	203-389-3492	KHammill@woodbridgect.org
Warren Connors	Director of Public Works	Town of Woodbridge	203-389-3421	wconnors@woodbridgect.org
Rebecca Andreucci	Regional Planner	SCRCOG	203-466-8601	randreucci@scrcog.org
FRANK COPPIELLO	POLICE CHIEF	WOODBRIDGE PD	203-397-5400	FCOPPIELLO@WOODBRIDGEPD.COM
RAY Stuart	Deputy Chief	Woodbridge Pd.	203 397 5400	rstuart@woodbridgepd.com
JOE Cappucci	Fire Marshal	woodbridge FD	203-389-3445	Jcappucci@woodbridgefire.com

STAKEHOLDER MEETINGS

SCRCOG
SOUTH CENTRAL REGIONAL COUNCIL OF GOVERNMENTS
Planning for Our Region's Future

Bethany Branford East Haven Guilford Hamden Madison Meriden Milford
New Haven North Branford North Haven Orange Wallingford West Haven Woodbridge

Carl J. Amento, Executive Director

South Central Regional Multi-Jurisdiction
Hazard Mitigation Plan Update

AGENDA
STAKEHOLDER MEETING

Project Introduction and Status Update

Hazard Mitigation Planning
- Purpose and need for hazard mitigation
- Grant Programs

Developing the Plan
- Risk Assessment
- Capability Assessment
- Mitigation Strategy

Mitigation Actions/Projects – Where Does Your Organization Fit?
- Local Plans & Regulations
- Structure & Infrastructure Projects
- Natural Systems Protection
- Education & Awareness Programs

Next Steps

For more information:
Eugene Livshits, Senior Regional Planner
203-466-8626
elivshits@scrcog.org
http://scrcog.org/regional-planning/regional-hazard-mitigation/

LEAGUE OF WOMEN VOTERS LETTER

1/19/18

Dear League Members,

The following is an opportunity to help make Hamden and North Haven more resilient communities.

Our towns are 2 of 15 towns within the South Central Regional Council of Governments (SCRCOG). The SCRCOG is currently reviewing the Multi-Jurisdiction Hazard Mitigation Plan for our region.

The purpose of the plan is to identify and assess natural hazard risks such as flooding, winter storms and hurricanes and determine how to best minimize or manage those risks. The Hazard Mitigation Plan is required for Jurisdictions to receive pre-disaster funds from FEMA.

The survey results will help the Planning Team to better understand local concerns and issues of citizens and can lead to mitigation activities that should help lessen the impacts of future disasters.

Please google: Town of Hamden- click on official site-government-departments- planning & Zoning- scroll down and click on Hazard Mitigation Plan- scroll down to link for Hazard Mitigation Plan and the power point will open.

To take the survey on the SCRCOG website go to: South Central Connecticut Hazard Mitigation Plan Survey

The plan calls for many actions to make our towns more resilient however the only plan for trees is extensive tree pruning. The loss of healthy, non-hazardous trees is happening across Connecticut. **A Harvard University report recently released says that "Connecticut is losing about 3,700 acres of forest a year to development and New England as a whole is seeing its woodlands disappear at a rate of 65 acres a day."**

We are paying a high economic cost for the extreme storms we are now experiencing. Trees help reduce those costs through their role as carbon sinks which help to slow climate change and mitigate against extreme weather. Trees also help to significantly reduce flooding and soil erosion as demonstrated by the mudslides that occurred after the wildfires in California destroyed hundreds of thousands of acres of trees.

It is important that we look at the full cost of removing our trees and the cost savings trees provide by cleaning our air, cooling our homes in the summer, providing homes for wildlife and birds who in turn eat insects, creating oxygen so we can breathe and much, much more. This is an opportunity to put our understanding of the essential services that trees provide, into action through a more comprehensive Hazard Mitigation Plan.

Extensive tree pruning is not a sufficient plan for our trees. The Hazard Mitigation Plan should also include a plan to significantly increase tree planting, caring for these newly planted trees (including watering when necessary) and protecting our existing healthy trees. **You can help by watching the short**

presentation, taking the survey and making a comment where allowed, to call for increased planting and care of trees.

Thank you for helping to create a more comprehensive Hazard Mitigation Plan for our part of the state of Connecticut.

Sincerely,

Diane Hoffman

LWV Hamden/North Haven

PRESS RELEASE FOR PUBLIC REVIEW OF THE PLAN

SCRCOG
SOUTH CENTRAL REGIONAL COUNCIL OF GOVERNMENTS
Planning for Our Region's Future

Bethany Branford East Haven Guilford Hamden Madison Meriden Milford
New Haven North Branford North Haven Orange Wallingford West Haven Woodbridge

Carl J. Amento, Executive Director

Public Invited to Comment on the
Draft South Central Region Multi-Jurisdiction Hazard Mitigation Plan

(NORTH HAVEN) The South Central Regional Council of Governments (SCRCOG) invites the public to review and comment on the Draft South Central Region Multi-Jurisdiction Hazard Mitigation Plan. The purpose of this plan is to identify and assess natural hazard risks (such as flooding, winter storms, and hurricanes) and determine how to best minimize or manage those risks. Public participation is an important part of the mitigation planning process. Residents, business owners and town officials of the SCRCOG municipalities are encouraged to review the plan.

The **Draft** South Central Region Multi-Jurisdiction Hazard Mitigation Plan is available for public review:

- April 30, 2018 – May 14, 2018
- Download the Plan from http://scrcog.org/regional-planning/regional-hazard-mitigation/

The South Central Regional Council of Governments began updating the previous regional Hazard Mitigation Plan with the help of a consulting team led by Jamie Caplan Consulting LLC with support from Milone & MacBroom and Punchard Consulting. An Advisory Committee comprised of representatives from Bethany, Branford, East Haven, Guilford, Hamden, Madison, Milford, New Haven, North Branford, North Haven, Orange, Wallingford, West Haven and Woodbridge.

The purpose of the South Central Region Multi-Jurisdiction Hazard Mitigation Plan Update is to provide the Region with a comprehensive examination of all natural hazards affecting the area and to provide a framework for informed decision-making regarding the selection of cost-effective mitigation actions. These mitigation actions, when implemented, will reduce the Region's risk and vulnerability from natural hazards. The hazard mitigation plan is a prerequisite for the municipalities to apply for state and federal mitigation grant funding.

To learn more about the project or to review the plan, please visit the project webpage at http://scrcog.org/regional-planning/regional-hazard-mitigation/.

For more information and to comment on the plan:
(customize with your name)
(customize with your number)
(customize with your email)
(customize with a link to your website if you like or put the SCRCOG link from above here)

PUBLIC COMMENTS RECEIVED FROM THE PLAN

From: Ed Hayden
Date: Tue, May 8, 2018 3:38 PM
To: Eugene Livshits;
Cc:
Subject: Hazard Mitigation Plan new entry

Please give favorable consideration to adding the following project to the SCROOG plan in East Haven; Address 138 Meadow Street storm drain overflowing due to silt build-up in culvert opposite the drain. This problem requires immediate attention to avoid road flooding and water backing up into the basements of homes. The town refuses to clean the culvert because it requires permits from state agencies.

Thank you for your consideration.

From: Henry Dynia <hpdynia@yahoo.com>
Sent: Monday, May 14, 2018 10:36 AM
To: Eugene Livshits <elivshits@scrcog.org>
Subject: Public Comment submission regarding the SCRCOG

Greetings Mr. Liveshits, please include my attached comments for inclusion in the record of public comment. Also, the following is a link to Anaheim California's utility undergrounding program. Proof that where there is a will, there is a way. Thank you for considering these comments - Henry Dynia

http://www.anaheim.net/972/Underground-Conversion

335 Forest St. Ext.
Hamden, CT 06518
May 10, 2018

Re: South Central Region Multi-Jurisdiction Hazard Mitigation Plan
To: Eugene Livshits – Senior Regional Planner (elivshits@scrcog.org)
From: Henry Dynia – Hamden resident

The South Central Region Multi-Jurisdiction Hazard Mitigation Plan does not adequately address the vulnerability of the electric power and telecommunications networks due to the preponderance of overhead wiring on wooden utility poles, almost without exception the universal distribution mode in Connecticut. **Damage to these systems occurs routinely from these causes:**

1. Wind storms (Nor'easters, hurricanes, tornados).
2. Blizzards and ice storms.
3. Vehicular crashes, and occasionally from aircraft (infrequent, but not unknown).
4. Structure and woodland fires.
5. Severe lighting storms.
6. Adjacent weak, dead, or diseased trees simply collapsing onto utility lines from gravity.

In addition to serious reliability problems that create life-threatening conditions during failure events, **overhead utility lines additionally have these negative effects:**

1. Visually degrade our city and town streetscapes with increasingly heavy loads of wiring, transformers, switchgear, and other related equipment.
2. Create more difficult and hazardous conditions for fire fighters.
3. Complicate construction and maintenance activities on adjacent projects and structures.
4. Result in a street lighting that looks disorderly (varied heights and spacing, wherever poles are available.
5. Restrictions on street tree locations and varieties.
6. Poles unnecessarily create lots of additional crash hazards for vehicles.
7. As poles become increasingly loaded, numerous guy wires, sometimes up to 5 or 6 are needed to prevent the poles from toppling over, and these are most commonly anchored on private adjacent property.
8. Impossibility of executing line repairs due to safety concerns, when they are needed most, during storm events.

Tree trimming, removal, and other "enhanced vegetation management" strategies will never give us a reliable power and telecommunications result, for the following reasons:

1. Because we live in a geographic area in which mature forests are the natural climax vegetation, it will never be possible to keep up with the necessary trimming, which is never final, but only a temporary solution.
2. Trimming branches above power lines makes the trees more vulnerable to splitting or other life threats due to improper pruning methods.
3. Removal of trees under power lines makes adjacent trees more vulnerable to wind damage, since they are now in a situation different than they matured under, and are not structurally equipped for greater wind exposure.
4. Even if all trees are removed from under the power lines ("blue-skying"), that will not save the utility lines from a toppling 80' tree located across the street or adjacent woodland.
5. Tree trimming and removal does nothing to prevent outages due to other factors, such as weak poles, fires, or vehicular damage.

1

Utilities in Connecticut have no interest in developing a long term plan for undergrounding their systems. In fact, they have created a public relations firewall against considering undergrounding that involves any of their resources. Yet they will spend hundreds of millions of our dollars in the coming decades on tree removal and pole replacement, while the public gets an increasingly degraded visual environment, loss of trees, and potentially catastrophic power outages due to extreme weather events. In the 1890's Thomas Edison insisted that his power networks in Manhattan were all installed underground. In the 1910 Civic Improvement Plan for New Haven, Frederick Law Olmstead Jr. and Cass Gilbert called for universal undergrounding starting at the city center and moving outward over time. We only got a few blocks in the center of the city free of overhead wiring. Serious undergrounding efforts died in the mid 20th century, and now only happens when someone else pays for it.

Resiliency is a new and compelling reason to re-start this effort, and continue it for the next 100 years. How to do it when the there is no leadership from the utilities or politicians? Politicians cannot be depended on to take up this cause because their project horizon is 2–4 years, not 50 or 100 years. What kind of world are we leaving for future generations? A vulnerable, ugly mess that looks like 3rd world undeveloped places? We have surrendered our public space to utilities, and now we must find a way to take it back. Here are some ideas:

1. We need legislation at the state level that crafts a way to fund a certain amount of undergrounding each year that is compatible with the multi-source funding structure they create.
2. Funding can be generated by a tiny surcharge on customer's monthly bills ($.50 or $1.00), some town bonded money, some state funds, possibly some Federal infrastructure money, some of the tree removal and overhead system maintenance (i.e. pole replacement) money, and some of the utility's profits.
3. This work can be combined to solve other street infrastructure problems simultaneously, such as water, sewer, drainage, and gas work, as well as pavement, sidewalk and curb work. If all this work goes to regional contractors, the money stays in the local economy.
4. Because the work will have to be spread over the next 50 to 100 years, the financial impact at any point in time will be minimal and do-able.
5. Working under an appropriate enabling legislative framework, PURA would be the overseer and monitor of this legislation to bring about the desired results.
6. The utilities operating in our state are not enjoying great public relations; such a program of undergrounding, if applied proportionally and equitably to all towns, would be a public relations positive outcome for the much maligned utility providers.

The utilities have successfully beat back any attempt to change the current paradigm, except to further degrade our physical environment by disfiguring and removing our trees. It is time, for resiliency and all the other reasons stated above, to change the trajectory for the next 5 generations and create true resiliency. We will never have it with a sky full of wires and poles. The current situation is an embarrassment, a multi-generation failure of public policy, and a lack of civic awareness and participation.

The SCRCOG Hazard Mitigation Plan has a responsibility to create momentum and public pressure to move our utility network to true resiliency. Please do not miss this moment to move the needle on this long-avoided issue.

2

SURVEY FLYER

Disaster Planning Public Survey

Available in English and Spanish

https://www.surveymonkey.com/r/CTMitigation

The South Central Regional Council of Governments (SCRCOG) is developing a Multi-Jurisdiction Hazard Mitigation Plan for 14 municipalities in South Central Connecticut. The purpose of the plan is to provide the region with a comprehensive examination of all natural hazards effecting the area and to provide a framework for informed decision-making regarding the selection of cost-effective mitigation actions. Provide your ideas regarding lessening the impact of natural hazards on the region. **Public Participation is Essential.**

For more information visit the project webpage:

http://www.scrcog.org/regional-planning/regional-hazard-mitigation/

SURVEY PRESS RELEASE

SCRCOG
SOUTH CENTRAL REGIONAL COUNCIL OF GOVERNMENTS
Planning for Our Region's Future

Bethany Branford East Haven Guilford Hamden Madison Meriden Milford
New Haven North Branford North Haven Orange Wallingford West Haven Woodbridge

Carl J. Amento, Executive Director

Public Participation Needed!
South Central Connecticut Hazard Mitigation Plan Survey

The South Central Regional Council of Governments (SCRCOG) and its municipalities are working together to prepare an update to the Multi-Jurisdiction Hazard Mitigation Plan. The purpose of this plan is to identify and assess the Region's natural hazard risks (such as flooding, winter storms, and hurricanes) and determine how to best minimize or manage those risks. **Public participation is essential!**

To help increase public participation SCRCOG has launched the South Central Connecticut Hazard Mitigation Plan Survey that provides an opportunity for everyone in the planning area to share his or her opinions and participate in the mitigation planning process. The information provided will help the Planning Team to better understand local concerns and issues as expressed by citizens of the Region, and can lead to mitigation activities that should help lessen the impacts of future disasters.

Participation in this survey is voluntary and none of the information provided will be attributed to individuals directly. The survey is located on the SCRCOG website and will only take about 5 minutes to complete. It is available in **English and in Spanish**.

To participate in the survey, go to:
https://www.surveymonkey.com/r/CTMitigation

To learn more about the project, please visit the project web page at:
http://scrcog.org/regional-planning/regional-hazard-mitigation

The public will have additional opportunities to participate in the development of the Multi-Jurisdiction Hazard Mitigation Plan by attending public meetings and reviewing the draft plan. These opportunities will be announced in the coming months.

For more information:
Eugene Livshits, Senior Regional Planner
203-466-8626
elivshits@scrcog.org
http://scrcog.org/regional-planning/regional-hazard-mitigation/

APPENDIX B. RISK ASSESSMENT SUPPORT MATERIALS

DATA COLLECTION WORKSHEET

Data Collection
June 19, 2017

Hurricane Sandy Appropriations and Grants

Mitigation actions may be informed by successful and unsuccessful grant applications submitted by SCRCOG communities for consideration in the last five years. Please provide the following copies:

- Grant applications submitted to the National Fish and Wildlife Foundation (NFWF) for grants through the Department of Interior *(we have copies for West Haven and Guilford)*
- Grant applications submitted to the CT Department of Housing for CDBG-DR funds through U.S. HUD *(we have copies for West Haven, Milford, and Branford)*
- Grant applications submitted to DEMHS for HMGP, PDM, and FMA funds from FEMA

Loss Estimates

Loss estimates are calculated from a review of the Connecticut Hazard Mitigation Plan Update (2014), NFIP insured loss figures, FEMA Public Assistance reimbursements, and HAZUS analysis. However, review of local loss estimates is needed to ground-truth these estimates and fill in data gaps for the hazards that are not typically captures using these methods.

Tornadoes and Severe Thunderstorms

- Has your municipality experienced any isolated downburst, hail, and/or intense thunderstorm activity in the past few years that might not be in any state or federal databases? If yes, please describe.
- Typical cost for the municipality to respond to downed branches and wires from a localized severe thunderstorm or downburst: _____

Winter Storms

- Public Assistance from DR-4106, Winter Storm, February 2013: $_____ (total request), $_____ (reimbursement)
- Public Assistance from DR-4213, Winter Storm, January 2015: $_____ (total request), $_____ (reimbursement)
- Typical cost for the municipality to severe winter storm: _____
- Typical annual snow management and deicing budget: _____
- Estimated Damage figures ($) associated with collapsed roofs and buildings in 2011 in your municipality (choose from examples below),

Reported Roof Collapse Damage, 2011

Address	Municipality	Date	Description
20 Sargent Drive	Bethany	2/2/2011	Fairfield County Millworks
50 Hunters Trail	Bethany	2/2/2011	Sun Gold Stables

Address	Municipality	Date	Description
759 Boston Post Road	Madison	2/3/2011	Silver Moon, The Brandon Gallery, Madison Coffee Shop and Madison Cinemas (awning began to collapse)
Pepe's Farm Road	Milford	1/30/2011	Vacant manufacturing building
282 Woodmont Road	Milford	2/2/2011	Kip's Tractor Barn
290 Goffe Street	New Haven	2/7/2011	New Haven Armory
136 Dudley Avenue	Wallingford	1/27/2011	Tri State Tires
1074 South Colony Road	Wallingford	1/29/2011	Zandri's Stillwood Inn
Island Lane	West Haven	1/27/2011	Commercial building

Wildfires

- Has your municipality experienced any isolated wildfire activity in the past few years that might not be in any state or federal databases? If yes, please describe.
- Total cost to fight "wildfires" in any given year: $_____
- Property damage from a typical wildfire in any given year: $_____

Critical Facilities

Critical facilities in each municipality were listed in the current hazard mitigation plan. It is important to understand if any changes in these facilities have occurred.

- Were any critical *facilities* relocated?
- Were any critical *functions* relocated? For example, the EOC could have been moved from one fire station to another.
- Has standby power been installed at any facilities that did not previously have standby power?
- Have any shelters been changed? For example, Guilford has a new high school that was constructed with the thought that it could serve as a shelter.

Historic and Cultural Resources

Estimating damage and losses to historic and cultural resources can be challenging because they are not necessarily included in Public Assistance reimbursements, and are often managed by private property owners or non-profits.

- Please provide any information you may have about losses to historic resources from flooding, wind events, snow events, etc.

APPENDIX C. CAPABILITY ASSESSMENT SUPPORT MATERIALS

NFIP STATUS SURVEY

National Flood Insurance Program (NFIP) Survey

First, please provide us with the following information. **Date:**

Name / Title:	
Jurisdiction:	
Phone / E-mail:	

1. **Please identify your jurisdiction's designated "Floodplain Administrator."** Please provide name, title, department and contact information (if different from above).

2. **Please list the regulations that were adopted to meet federal NFIP requirements, including the date and section number.** These may include a flood damage prevention ordinance, building codes, subdivision regulations, etc.

3. **Describe any local "higher standards" that exceed NFIP minimum requirements.** These may include higher finished floor elevation requirements ("freeboard"), foundation protection, more stringent building improvement rules, protection of critical facilities, low density zoning for floodplain development, preservation of floodplain storage, higher mapping and regulatory standards, etc.

4. **Describe any additional floodplain management provisions that are integrated into other plans or processes that the community uses to guide development.** These may include those integrated with the general plan, small area plans, capital improvements plans, etc.

5. **Describe any other floodplain management activities your jurisdiction performs that go beyond FEMA minimum requirements.** This includes activities such as drainage system maintenance, flood warning systems, or any public education or outreach activities related to promoting flood risk awareness, risk reduction, and the availability of flood insurance.

6. **What is the date of your jurisdiction's last NFIP Community Assistance Visit (CAV) of Community Assistance Contact (CAC)?** Please also identify any compliance issues that were identified and how they were resolved, and if another CAV or CAC is scheduled or needed.

7. **Please describe any existing impediments to running an effective NFIP program in the community, if any.**

8. **Please identify some specific actions that your jurisdiction can take related to continued compliance with the NFIP.** This may include a description of key elements that already contribute to an effective program such as building permit procedures, site plan reviews, field inspections and permanent retention of records. This may also include new actions to improve existing programs, such as those listed on the following page (*please check any that your jurisdiction may be interested in pursuing*).

NFIP Survey
Page 2

Possible new actions related to NFIP Compliance:

- ☐ Maintain digital FEMA elevation certificates for all construction in the floodplain.
- ☐ Evaluate and consider the adoption of "higher standards" that are proven to reduce flood damage such as those described under Question #3 (especially freeboard, setbacks, limitations on lower-level enclosure size, and the prohibition on use of fill).
- ☐ Evaluate current floodplain management activities and coordinate with Insurance Services Office, Inc. to apply for participation in FEMA's Community Rating System (CRS).
- ☐ Evaluate permit application forms to determine possible modifications focused on flood hazard prevention.
- ☐ Develop a checklist for review of building/development permit plans and for inspection of development in floodplains (a model is available).
- ☐ Establish a goal to have each plan reviewer and building inspector attend a related training periodically (for example, ASFPM's Annual National Conference, chapter conferences, webinars, etc).
- ☐ Sponsor a periodic NFIP workshop for local surveyors and builders.
- ☐ Encourage or require certain local staff positions to obtain and maintain Certified Floodplain Manager (CFM) certification.
- ☐ Maintain a map of areas that flood frequently (e.g., areas where repetitive loss properties are located) and prioritize those areas for inspection immediately after the next flood. If outside FEMA special flood hazard areas, consider requiring existing NFIP regulatory standards (compliance with existing ordinance) through overlay zoning, etc.
- ☐ Hold informative work sessions for newly elected officials and new appointees to planning commissions and appeals/variance boards, to provide an overview of floodplain management, the importance of participating in the NFIP, and the implications of failing to enforce the requirements of the program or failing to properly handle variance requests.
- ☐ Obtain FEMA's Substantial Damage Estimator and attend training to be prepared to use it when damage occurs; develop mutual aid agreements with other jurisdictions to augment local inspection personnel after major disasters.
- ☐ Conduct a review of other regulatory programs and planning tools, such as the comprehensive plan and zoning ordinance, and report on opportunities to improve consistency with the objectives of floodplain management.
- ☐ Maintain supplies of FEMA/NFIP materials to help property owners evaluate measures to reduce potential hazard damage. Make available in public buildings, local library, website, etc. and inform people who they can call to learn more information.
- ☐ Send information about the flood hazard and promote the availability of flood insurance through regularly scheduled mailings (such as the dissemination of handouts with annual property tax notices, utility bills, etc.).
- ☐ Develop handouts for permit applications on specific issues such as installation of manufactured homes in flood hazard areas according to HUD's installation standards (examples available), or guidance on improving/repairing existing buildings to better withstand potential hazards.

SAFE GROWTH SURVEY

BLANK SURVEY

SAFE GROWTH SURVEY

Name of person completing the survey: Date:

Municipality Representing:

This survey instrument is designed to capture some general information for purposes of developing the *South Central Region Multi-Jurisdiction Hazard Mitigation Plan*. It has been adapted from a technique recommended by the American Planning Association (APA) and FEMA to help evaluate the extent to which each municipality is positioned to grow safely relative to its natural hazards. These hazards include but are not limited to hurricanes and other coastal storms, floods, fires, winter storms and other severe weather systems.

Please indicate how strongly you agree or disagree with the following statements as they relate to the Town's current plans, policies, and programs for guiding future community growth and development.

1 = Strongly Disagree 2 = Somewhat Disagree 3 = Neutral 4 = Somewhat Agree 5 = Strongly Agree

GENERAL PLAN	
Land Use	
1. The general plan includes a future land use map that clearly identifies natural hazard areas.	1 2 3 4 5
2. Current land use policies discourage development and/or redevelopment within natural hazard areas.	1 2 3 4 5
3. The general plan provides adequate space for expected future growth in areas located outside of natural hazard areas.	1 2 3 4 5
Transportation	
4. The transportation element limits access to natural hazard areas.	1 2 3 4 5
5. Transportation policy is used to guide future growth and development to safe locations.	1 2 3 4 5
6. Transportation systems are designed to function under disaster conditions (e.g., evacuation, mobility for fire/rescue apparatus, etc.).	1 2 3 4 5
Environmental Management	
7. Environmental features that serve to protect development from hazards (e.g., wetlands, riparian buffers, etc.) are identified and mapped.	1 2 3 4 5

Safe Growth Survey
Page 2

8. Environmental policies encourage the preservation and restoration of protective ecosystems.	1 2 3 4 5
9. Environmental policies provide incentives to development that is located outside of protective ecosystems.	1 2 3 4 5
Public Safety	
10. The goals and policies of the general plan are related to and consistent with those in the Hazard Mitigation Plan.	1 2 3 4 5
11. Public safety is explicitly included in the plan's growth and development policies.	1 2 3 4 5
12. The monitoring and implementation section of the plan covers safe growth objectives.	1 2 3 4 5
ZONING ORDINANCE	
13. The zoning ordinance conforms to the general plan in terms of discouraging development and/or redevelopment within natural hazard areas.	1 2 3 4 5
14. The ordinance contains natural hazard overlay zones that set conditions for land use within such zones.	1 2 3 4 5
15. Rezoning procedures recognize natural hazard areas as limits on zoning changes that allow greater intensity or density of use.	1 2 3 4 5
16. The ordinance prohibits development within, or filling of, wetlands, floodways, and floodplains.	1 2 3 4 5
SUBDIVISION REGULATIONS	
17. The subdivision regulations restrict the subdivision of land within or adjacent to natural hazard areas.	1 2 3 4 5
18. The regulations provide for conservation subdivisions or cluster subdivisions in order to conserve environmental resources.	1 2 3 4 5
19. The regulations allow density transfers where hazard areas exist.	1 2 3 4 5

SAFE GROWTH SURVEY

CAPITAL IMPROVEMENT PROGRAM AND INFRASTRUCTURE POLICIES						
20.	The capital improvement program limits expenditures on projects that would encourage development and/or redevelopment in areas vulnerable to natural hazards.	1	2	3	4	5
21.	Infrastructure policies limit the extension of existing facilities and services that would encourage development in areas vulnerable to natural hazards.	1	2	3	4	5
22.	The capital improvements program provides funding for hazard mitigation projects identified in the Hazard Mitigation Plan.	1	2	3	4	5
OTHER						
23.	Small area or corridor plans recognize the need to avoid or mitigate natural hazards.	1	2	3	4	5
24.	The building code contains provisions to strengthen or elevate new or substantially improved construction to withstand hazard forces.	1	2	3	4	5
25.	Economic development and/or redevelopment strategies include provisions for mitigating natural hazards or otherwise enhancing social and economic resiliency to hazards.	1	2	3	4	5

Thank you for your assistance in completing this survey.

RESULTS OF SURVEY

Table A-221 Safe Growth Survey Results

Safe Growth Statement	Bethany	Branford	East Haven	Guilford	Hamden	Madison	Milford	New Haven	North Branford	North Haven	Orange	Wallingford	West Haven	Woodbridge	Region Average
Land Use															
The comprehensive plan includes a future land use map that clearly identifies natural hazard areas.	5	4	4	4	5	4	4	5	4	4	*	4	4	3	**4.1**
Current land use policies discourage development and/or redevelopment within natural hazard areas.	5	2	4	4	5	4	4	4	5	4	*	3	5	5	**4.1**
The comprehensive plan provides adequate space for expected future growth in areas located outside of natural hazard areas.	5	2	4	5	5	4	4	5	5	4	*	5	4	5	**4.3**

Transportation															
The transportation element limits access to natural hazard areas.	5	4	4	3	3	3	1	3	4	2	*	3	3	3	**3.1**
Transportation policy is used to guide future growth and development to safe locations.	5	4	4	3	3	3	1	4	5	3	*	4	3	3	**3.4**
Transportation systems are designed to function under disaster conditions (e.g., evacuation, mobility for fire/rescue apparatus, etc.).	3	1	4	3	3	4	4	5	4	2	*	3	2	5	**3.3**
Environmental Management															
Environmental features that serve to protect development from hazards (e.g., wetlands, riparian buffers, etc.) are identified and mapped.	5	4	4	5	5	4	4	3	5	4	*	5	4	4	**4.3**
Environmental policies encourage the preservation and restoration of	5	5	4	5	5	4	5	5	4	4	*	5	5	5	**4.6**

protective ecosystems.															
Environmental policies provide incentives to development that is located outside of protective ecosystems.	5	3	4	4	3	2	3	2	2	2	*	3	2	3	**2.9**
Public Safety															
The goals and policies of the comprehensive plan are related to and consistent with those in the Multi-Jurisdictional Hazard Mitigation Plan.	3	4	4	3	4	3	4	5	4	4	*	3	4	3	**3.6**
Public safety is explicitly included in the plan's growth and development policies.	2	3	4	3	3	3	4	5	2	4	*	3	3	5	**3.3**
The monitoring and implementation section of the plan covers safe growth objectives.	5	4	4	3	3	4	3	3	4	2	*	3	2	5	**3.4**
Zoning Ordinance															

The zoning ordinance conforms to the comprehensive plan in terms of discouraging development and/or redevelopment within natural hazard areas.	5	2	4	4	5	4	3	3	2	4	*	4	4	5	**3.7**
The ordinance contains natural hazard overlay zones that set conditions for land use within such zones.	3	4	4	4	5	4	5	2	2	4	*	4	2	5	**3.6**
Rezoning procedures recognize natural hazard areas as limits on zoning changes that allow greater intensity or density of use.	5	4	4	4	4	4	5	4	1	3	*	4	2	3	**3.6**
The ordinance prohibits development within, or filling of, wetlands, floodways, and floodplains.	5	1	4	3	4	5	3	3	4	2	*	4	4	5	**3.6**
Subdivision Regulations															
The subdivision regulations restrict the subdivision of	5	1	4	4	4	4	3	3	4	2	*	3	3	3	**3.3**

land within or adjacent to natural hazard areas.															
The regulations provide for conservation subdivisions or cluster subdivisions in order to conserve environmental resources.	5	2	4	5	5	5	4	3	4	4	*	5	2	3	**3.9**
The regulations allow density transfers where hazard areas exist.	3	2	4	3	1	2	3	3	1	1	*	1	2	3	**2.2**
Capital Improvement Program and Infrastructure Policies															
The capital improvements program limits expenditures on projects that would encourage development and/or redevelopment in areas vulnerable to natural hazards.	3	2	3	3	3	3	4	3	4	4	*	5	3	3	**3.3**
Infrastructure policies limit the extension of existing facilities and services that would encourage development in areas vulnerable	5	2	4	3	4	3	4	3	3	4	*	4	3	3	**3.4**

to natural hazards.															
The capital improvements program provides funding for hazard mitigation projects identified in the South Central Connecticut Multi-jurisdictional Hazard Mitigation Plan.	3	4	4	3	5	2	5	5	4	2	*	4	3	4	**3.6**
Other															
Small area or corridor plans recognize the need to avoid or 4mitigate natural hazards.	5	3	4	4	3	3	4	5	3	2	*	3	3	3	**3.4**
The building code contains provisions to strengthen or elevate new or substantially improved construction to withstand hazard forces.	3	4	4	4	4	4	5	5	5	4	*	4	5	5	**4.3**
Economic development and/or redevelopment strategies	3	3	4	4	3	3	3	5	3	3	*	3	4	3	**3.3**

include provisions for mitigating natural hazards or otherwise enhancing social and economic resiliency to hazards.															
Jurisdiction Average	4.2	2.9	3.9	3.7	3.8	3.4	3.6	3.8	3.5	3	*	3.6	3.2	3.8	**3.5**
Overall Region Average	**3.5**														

GNHWPCA OVERVIEW

GNHWPCA FEMA – HAZARD MITIGATION PLANNING SUMMARY

Overview of Hazard Mitigation Grant Program

Hazard mitigation is the effort to reduce loss of life and property by lessening the impact of disasters. The Department of Homeland Security (DHS), Federal Emergency Management Agency (FEMA) administers a hazard mitigation grant funding program (HMGP) to incentivize State, tribal, and local governments to engage in hazard mitigation planning. The purpose of such planning is to identify risks and vulnerabilities associated with natural disasters, and develop long-term strategies for protecting people and property from future hazard events. The establishment of a FEMA-approved local or multi-jurisdictional Natural Hazard Mitigation Plan that meets the requirements of 44 C.F.R Pt 201 is a condition for receiving certain types of non-emergency disaster assistance, including grant funding for mitigation projects.

The GNHWPCA is eligible to directly apply for hazard mitigation funding from the FEMA HMGP, however, funding can only be awarded if the local government in which the project will take place maintains an FEMA-approved Hazard Mitigation Plan.

GNHWPCA – Local Government FEMA-Approved Hazard Mitigation Plans (HMP) Status

The GNHWPCA was formed as an independent regional sewer authority in 2005 by an act of the legislature and concurrent ordinances adopted by each of its Constituent Municipalities. The purpose of the GNHWPCA is to own, use, equip, repair, maintain, supervise, manage, operate and perform any act pertinent to the collection, transportation, treatment and disposal of sewage with respect to its Constituent Municipalities. GNHWPCA's constituent municipalities include New Haven, East Haven, Hamden, and Woodbridge.

The Constituent Municipalities are all members of the South-Central Connecticut Regional Council of Governments (SCRCOG). SCRCOG is in the process of completing a multi-jurisdictional HMP that includes East Haven, Hamden and Woodbridge. SCRCOG previously prepared a multi-jurisdictional HMP that included Hamden and Woodbridge and which is scheduled to expire in 2019. East Haven and New Haven, however, had separately prepared their own local HMP which included the GNHWPCA critical facilities. The East Haven HMP expired in May 2017 and is now being updated by SCRCOG. The New Haven HMP is approved through 2021.

The inclusion of GNHWPCA in the local HMPs allowed GNHWPCA, in 2015, to secure a FEMA HMGP grant for resiliency improvements at four coastal pump stations in East Haven and to submit an application for resiliency improvements four critical facilities in New Haven. Unfortunately, the bid pricing received for the East Haven Coast Pump Stations Project resulted in construction costs that exceeded the original engineer's estimate. As such, construction of the project has been delayed. The GNHWPCA has submitted a cost overrun request to DEMHS/FEMA which has received preliminary approval, however, final approval is pending until such time that East Haven adopts a new FEMA – approved HMP.

GNHWPCA FEMA – HAZARD MITIGATION PLANNING SUMMARY

GNHWPCA Critical Facilities

GNHWPCA provides critical wastewater collection and treatment services to a population of over 200,000 using an extensive sewer collection system that includes over 555 miles of sanitary, separated, and combined sewers, 10 miles of force mains and pressure sewers, 30 pump stations, 6 siphons and a combined sewer overflow (CSO) storage tank that convey flow to the East Shore Wastewater Pollution Abatement Facility (ESWPAF) for treatment. The ESWPAF, located on the shore of the New Haven Harbor, treats approximately 40 million gallons per day (MGD) of raw sewage and it is the second largest wastewater treatment plant in Connecticut. Many of GNHWPCA's critical facilities are in coastal areas along the shoreline of the Long Island Sound.

A summary of the population served by the GNHWPCA with each of the Constituent Municipalities is presented in Table 1.

Table 1: Population and Customers of the Constituent Municipalities

Municipality	Sewered Population [1]	No. of Customers [2]
New Haven	128,600	22,901
Hamden	52,000	14,458
East Haven	27,400	10,215
Woodbridge	900	372
TOTAL	**208,900**	**47,946**

(1) Based on July 1, 2016 vintage year (V2016) population data published by the US Census Bureau Quick Facts and the estimated percentage of population served within each municipality.

(2) Based on the GNHWPCA's Customer Records Information (CRIS) database records for FY2017.

A summary of the number of critical facilities located in each of the Constituent Municipalities is presented in Table 2 below. A listing of each of the pump stations is provided in Exhibit 1.

Table 2: GNHWPCA Summary of Wastewater System Infrastructure (Size/No.)

	New Haven	Hamden	East Haven	Woodbridge
Treatment Plant [1]	ESWPAF (40 mgd)	N/A	N/A	N/A
Pump Stations [2]	15	8	6	1
Siphons	1	3	2	0
Sewer Pipes [3]	257 miles	184 miles	114 miles	10 miles
Manholes	8,700	4,900	3,000	200
Administrative Offices	1	N/A	N/A	N/A
Supplemental Office/ Storage Building	1	N/A	N/A	N/A

(1) The GNHWPCA ESWPAF has a dry weather design capacity of 40 million gallons per day (mgd) and a wet weather capacity of 110 mgd.

(2) The number for New Haven is exclusive of the equipment at the Truman Tank, James Street Siphon and ESWPAF.

(3) Estimated miles of active sewer pipe owned by GNHWPCA based on FY2017 GIS data. Miles include gravity sewers, pressure sewers, force mains and siphons.

GNHWPCA FEMA – HAZARD MITIGATION PLANNING SUMMARY

The Constituent Municipalities' HMP recognize the criticality of wastewater services and GNHWPCA's facilities and has identified many natural hazards as having the potential to significantly impact residents and the regional community. These hazards include, but are not limited to, power outages and flooding due to inland/coastal flooding, sea level rise and summer/winter storms.

Hurricane Irene in August 2011 and Superstorm Sandy in October 2012 significantly impacted several critical GNHWPCA facilities. The submission of the FEMA HMG application in 2013 for four coastal pump stations in East Haven and four critical facilities in New Haven were a direct result of impacts these storms had on these critical facilities that were vulnerable to flooding and storm surge. The GNHWPCA has identified a number of other facilities which are also vulnerable for which risk analysis are updated on an annual basis and mitigation efforts are being implemented as financial priorities allow.

Flood Resiliency Improvements in East Haven

The GNHWPCA applied for and received funding from the Federal Emergency Management Agency (FEMA) Hazard Mitigation Grant Program (HMGP) to implement resiliency improvements at four coastal pump stations located in East Haven, CT. The East Haven Pump Station Resiliency Implementation Project (Project), which was originally awarded in January 2015, addresses flood resiliency at the GNHWPCA's a) Cosey Beach Pump Station, b) Minor Road Pump Station, c) Meadow Street Pump Station, and d) Farview Road Pump Station. The location for the four pump stations is presented in Table 1.

Table 1: Project Site Locations

Pump Station	Address	Existing Structure / Utility Enclosure	Date of Structure	Zone
Farview Rd.	24 Farview Rd., East Haven	2 Floors – Basement Concrete Block – 1st floor 18'x18.5' Glazed Block w/Brick Veneer	1962	R-1
Cosey Beach	25 Cosey Beach Ave., East Haven	Above ground 20'x20' Split Face Concrete Block	1978	S-1
Meadow St.	79 Meadow St., East Haven	Above ground 19'x19' Cast-In-Place Concrete	1978	R-1
Minor Rd.	175 Beach Ave., East Haven	Above ground 20'x20' Split Face Concrete Block	1978	R-3

The intent of this resiliency Project is to modify the existing sanitary sewer infrastructure facilities to reduce or eliminate the long-term risk of flood damage to these pump stations. During the grant period of performance, activities to flood-proof the pump stations include the elevation of electrical equipment and controls and the installation of larger diesel-powered generators on an elevated platform located adjacent to the existing structure at each site. Piles will be used to support the platform on which the generator, fuel tanks and electrical controls will be elevated to the 500-year flood level. An enclosure will be constructed which will house the elevated generator, fuel tank and the electronic components,

GNHWPCA FEMA – HAZARD MITIGATION PLANNING SUMMARY

conduit wiring and junction boxes. Stairs will be constructed to access to elevated platforms. Railings will be installed to prevent trips and falls. The GNHWPCA intends to install new submersible pumps that have the longer, integral, factory installed cords/pump cables of sufficient length to reach the new elevated platform disconnects without splicing of any wires. The pump stations must also remain in continuous operation during construction. The Construction Contract is scheduled to be awarded in 2017 and the project completed prior to December 31, 2018.

Flood Resiliency Improvements in New Haven

The GNHWPCA has applied for and funding approval is pending from the Federal Emergency Management Agency (FEMA) Hazard Mitigation Grant Program (HMGP) to implement resiliency improvements at four locations in New Haven, CT. The New Haven Pump Station Resiliency Implementation Project (funding award anticipated in January 2018), will address flood resiliency improvements at the GNHWPCA's a) East Street Pump Station, b) Boulevard Pump Station, c) Fort Hale Pump Station, and d) ESWPAF Operations Building. The location of these facilities is presented in Table 2.

Table 2: Project Site Locations

Facility	Address	Existing Structures Impacted	Date of Structure	Zone
Fort Hale PS	25 Woodward Avenue, New Haven	Concrete utility structure approximately 16'x16'	1967	RS2
Boulevard PS	19 Sea Street, New Haven	One story masonry building with gross area of 15,938 square feet	1989	RM1
ESWPAF	345 East Shore Parkway, New Haven	Operations Building – two story brick building gross area of 49,248 square feet.	1992	IH
East Street PS	1 East Street Ext., New Haven	Concrete building approximately 5000 sf	1985	IL

The intent of the New Haven resiliency project is to modify the existing sanitary sewer infrastructure facilities to reduce or eliminate the long-term risk of flood damage to these facilities. Activities to flood proof the facilities include the elevating electrical equipment and controls and the installing a larger diesel-powered generators on an elevated platform at the Fort Hale Pump Station and installing flood walls and stop logs and flood proofing windows at the East Street, Boulevard and the ESWPAF. Design will begin immediately upon award of funding from FEMA and the project completed prior to August 2019.

Hazard Mitigation Planning and Coordination

GNHWPCA completed a vulnerability analysis of its wastewater system that meets the requirements of the Bioterrorism Act to address both malevolent actions and natural hazards. This analysis resulted in the development of several capital improvement projects and enhancement in operation and

GNHWPCA FEMA – HAZARD MITIGATION PLANNING SUMMARY

maintenance practices to manage risks associated with GNHWPCA's potentially vulnerable assets. GNHWPCA conducts an annual assessment of vulnerable facilities and updates its proposed capital and operation and maintenance plans as part of annual budget planning process.

GNHWPCA services are wholly funded through user fees charged to its customers. Prioritization of capital requirements is required to maintain affordability of user rates while still meeting increasing regulatory requirements. To the extent GNHWPCA can secure grant and low-cost financing from state and federal agencies to implement required projects and mitigate hazards the quicker such projects can be implemented.

GNHWPCA also maintains both an Emergency Response Plan (ERP) and an Incident Management and Business Continuity Plan (BCP) to coordinate and facilitate immediate and long-term response to an occurrence be it natural or manmade. These plans assist in planning and coordinating emergency activities both locally in its service area and regionally in the industry. The ERP plan includes a comprehensive list of contacts for officials and vulnerable establishments such as hospitals and universities in the service area to further facilitate coordination of activities. GNHWPCA is a member of the Connecticut's Water/Wastewater Agency Response Network (CtWARN) which is managed by water and wastewater utilities to support statewide emergency preparedness, emergency response and mutual aid. Any municipality and/or water/wastewater utility can become a member of CtWARN.

Future Hazard Mitigation Projects

GNHWPCA maintains a 5-year and a 20-year capital improvement plan that includes projects to meet regulatory requirements, increase efficiency and effectiveness, replace aging infrastructure, and reduce potential loss/damage to critical wastewater infrastructure during a hazard event. The largest component of the GNHWPCA's 20-year capital improvement plan is the implementation of the New Haven Long Term Combined Sewer Overflow (CSO) Control Plan (Long-Term Control Plan). The goal of the Long-Term Control Plan is to provide measures necessary to achieve zero discharge from all CSO outfalls during a 2-year, 6-hour design storm by 2040. The GNHWPCA's capital plan is updated on an annual basis. The Long-Term Control Plan is updated approximately every 6 years.

Potential future hazard mitigation projects, include, but are not limited to:

- Relocation of the Long-Wharf Pump Station in New Haven to adjacent Department of Transportation (DOT) right-of-way property outside of the flood zone.
- New permanent generator(s) for the East Street Pump Station.
- Continue to implement the CSO Long-Term Control Plan.
- Continue to upgrade pump stations to improve resiliency.
- Protect critical forcemain and sewer collection system infrastructure in low lying areas from storm erosion and damage.

GNHWPCA FEMA – HAZARD MITIGATION PLANNING SUMMARY

EXHIBIT 1

GNHWPCA PUMPING STATIONS

Constituent Municipality	Name of Pump Station
New Haven	Barnes Avenue
	Boulevard
	East Street
	Fort Hale
	Humphrey Street
	Long Wharf
	Market Street
	Mitchell Drive
	Morris Cove
	New Grand Avenue
	Old Grand Avenue
	Quinnipiac
	State and Union Street
	Stone Street
	West Rock
	James Street Siphon
Hamden	Lovell Street
	Mill Rock
	Old Chauncy Road
	Putnam Avenue
	State Street
	Welton Street
	Whitneyville
East Haven	Cosey Beach
	Fairview Road
	Main Street
	Meadow Street
	Minor Road
	Upper Thompson Street
Woodbridge	Woodbridge – Ansonia Rd

APPENDIX D. MITIGATION STRATEGY SUPPORT MATERIALS

RANKING MITIGATION ACTIONS CRITERIA HANDOUT

RANKING MITIGATION ACTIONS

Mitigation Priorities

- **Very High** – extremely beneficial projects that will greatly contribute to mitigation of multiple hazards and the protection of people and property. These projects are also given a numeric ranking within the category.
- **High** – Strategies that provide mitigation of several hazards and have a large benefit that warrants their cost and time to complete.
- **Medium** – Strategies that would have some benefit to people and property and are somewhat cost effective at reducing damage to property and people.
- **Low** – Strategies that would not have a significant benefit to property or people, address only one or two hazards, or would require funding and time resources that are impractical.

These categories were developed utilizing the following criteria:

Application to multiple hazards – Strategies are given a higher priority if they assist in the mitigation of several natural hazards.

Time required for completion – Projects that are faster to implement, either due to the nature of the permitting process or other regulatory procedures, or because of the time it takes to secure funding, are given higher priority.

Estimated benefit – Strategies which would provide the highest degree of reduction in loss of property and life are given a higher priority. This estimate is based on the Risk Assessment Chapter, particularly regarding how much of each hazard's impact would be mitigated.

Cost effectiveness – To maximize the effect of mitigation efforts using limited funds, priority is given to low-cost strategies. Strategies that have identified potential funding streams, such as the Hazard Mitigation Grant Program, are also given higher priority.

Cost of Mitigation Projects

- **Very High – over $1,000,000**
- **High** – over $500,000
- **Medium** - $100,000-$500,000
- **Low** – under $100,000

COMPLETED MITIGATION ACTION PLAN WORKSHEETS

2014

Table 7.132 Plan Update Evaluation Worksheet

Plan Section	Considerations	Explanation
Planning Process	Should new jurisdictions and/or districts be invited to participate in future plan updates?	Yes- We approve new jurisdictions being added to the next phase of planning
	Have any internal or external agencies been invaluable to the mitigation strategy?	The airport planning commission - Hanger project Tree Warden - Tree removal project Public Works - Several phases
	Can any procedures (e.g., meeting announcements, plan updates) be done differently or more efficiently?	Better resource materials for public information sessions, Use of cabkle tv public access.
	Has the Advisory Committee undertaken any public outreach activities?	For the hanger project only
	How can public participation be improved?	More activities such as public forums
	Have there been any changes in public support and/or decision-maker priorities related to hazard mitigation?	No
Capability Assessment	Have jurisdictions adopted new policies, plans, regulations, or reports that could be incorporated into this plan?	Not that we are familiar with, none in Bethany
	Are there different or additional administrative, human, technical, and financial resources available for mitigation planning?	Actually less resources are avalable due to current State and local budget considerations.
	Are there different or new education and outreach programs and resources available for mitigation activities?	More internet
	Has NFIP participation changed in the participating jurisdictions?	Not in Bethany
Risk Assessment	Has a natural and/or technical or human-caused disaster occurred?	No
	Should the list of hazards addressed in the Plan be modified?	Not at this time
	Are there new data sources and/or additional maps and studies available? If so, what are they and what have they revealed? Should the information be incorporated into future plan updates?	Changes in town maps are recorded in the Town Clerk's files
	Do any new critical facilities or infrastructure need to be added to	not at this time

BLANK MITIGATION ACTION PLAN WORKSHEETS – DIRECTLY CONNECTED TO EXCEL SPREADSHEET

South Central Region Multi-Jurisdictional Hazard Mitigation Plan – 2017 Update

Mitigation Action Worksheet

Jurisdiction:	
Action Title: *Provide brief summary of the proposed action (5-10 words)*	
Action Description: *Describe proposed action in more detail, with some background on the issue or problem it will address*	
Hazard(s) Addressed: *Indicate the specific hazard(s) the action will attempt to mitigate*	
Estimated Cost: *Provide general cost estimate, if applicable, or indicate other required resources (e.g., "staff time")*	
Lead Department: *Indicate the department or office with primary responsibility to carry the action out*	
Partners: *Indicate any supporting partners to help carry the action out*	
Potential Funding: *Indicate any potential funding sources, if applicable*	
Implementation Schedule: *Indicate the general timeline or anticipated date of completion*	
Priority: *Classify the action as a High, Moderate, or Low priority based on a general review of benefits vs. costs*	
Worksheet Completed By:	

Please send completed worksheets to Darrin Punchard at darrin@punchardconsulting.com

2018 – 2023 MITIGATION ACTIONS

The information contained here is taken directly from the Mitigation Action Tracker. It is much simpler to view the information in the Tracker. It is included here to represent completeness.

SCRCOG Jurisdiction-Specific Mitigation Actions
2018-2023

SCRCOG Mitigation Actions

Action #	Action Title	Action Description	Mitigation Goal	Mitigation Category	Hazard(s) Addressed	Estimated Cost	Potential Funding Source	Lead Department	Implementation Schedule	Priority
1	Plan Maintenance	SCRCOG will maintain the current mitigation plan by seeking updates and feedback as needed.	Community Planning	Local Plans & Regulations	All Hazards	$100,000	FEMA Mitigation Grant Programs	SCRCOG Staff	July 2018 – July 2023	Very High
2	Host and Facilitate Annual Mitigation Meetings	SCRCOG will continue to facilitate multi-jurisdiction collaboration through the hosting of annual mitigation meetings.	Regional Collaboration	Local Plans & Regulations	All Hazards	$1,000	SCRCOG	SCRCOG Staff	July 2018 – July 2023	High
3	Maintain Mitigation Website	SCRCOG will continue to maintain and update the Regional Hazard Mitigation webpages.	Public Education & Preparedness	Education & Awareness Programs	All Hazards	$2,000	SCRCOG	SCRCOG Staff	July 2018 – July 2023	High
4	Increase Plan Participation for Local Jurisdictions	SCRCOG will work to incorporate the Town of Meriden into the plan during the next plan update process.	Community Planning	Local Plans & Regulations	All Hazards	$25,000	FEMA Mitigation Grant Programs	SCRCOG Staff	July 2022 – July 2023	Medium
5	Promote the CRS Program	SCRCOG will collaborate with its member municipalities to determine if there is interest in the CRS Program, and the type of technical assistance its member municipalities may require.	Flood Hazards	Natural Systems Protection	Riverine and Coastal Flood	$50,000	FEMA Grant Programs; SCRCOG	SCRCOG Staff	March 2018 – March 2019	Medium
6	Mitigation Education and Awareness	SCRCOG will engage with its member municipalities to determine the necessary materials that may be needed for education opportunities. The materials may include mapping and presentations.	Public Education & Preparedness	Education & Awareness Programs	All Hazards	$10,000	SCRCOG	SCRCOG Staff	May 2018 – May 2021	Medium
7	Promote Awareness of Mitigation Grant Funding Opportunities	SCRCOG will continue to provide information to its members of mitigation grant opportunities. SCRCOG will explore opportunities for collaboration to pursue grant opportunities relevant to hazard mitigation.	Public Education & Preparedness	Education & Awareness Programs	All Hazards	$5,000	SCRCOG (subscription service)	SCRCOG Staff	July 2018 – July 2023	Medium

* Exported from SCRCOG's Mitigation Action Tracker, April 2018

SCRCOG Jurisdiction-Specific Mitigation Actions
2018-2023

Bethany Mitigation Actions

Action #	Action Title	Action Description	Mitigation Goal	Mitigation Category	Hazard(s) Addressed	Estimated Cost	Potential Funding Source	Lead Department	Implementation Schedule	Priority
1	Hazard Tree Management	Continue the Town's aggressive tree removal program in coordination with local utility companies to identify and prioritize trees for the most urgent removal.	Trees	Natural Systems Protection	Severe Winter Storm/Nor'easter; Hurricane/Tropical	$100,000	Local (operating budget)	Tree Warden	Through 2023	High
2	Town Hall Generator	Install electric generator and quick-connect transfer switch to provide backup emergency power for Town Hall.	Public Education & Preparedness	Emergency Preparedness	All Hazards	$50,000	Capital Improvement Plan Funding	Public Works	Scheduled for completion by 5/31/2018	High
3	Homebound and Elderly Resident Directory	Develop and maintain a Homebound and Elderly Resident Directory in order to quickly identify people with special needs during and following long-term power outages or other related emergency or disaster events. The Town will continue to collect data for both the senior and special needs population and will develop a method for Emergency Management to access data in time of emergency retaining confidentiality.	Public Education & Preparedness	Emergency Preparedness	All Hazards	$25,000	Federal / State / Local	Human Services	Through 2023. Implementation of a secure electronic database is underway.	Medium
4	Community Shelter	As part of the ongoing project to replace the hanger at the old airport on Amity Road, ensure capabilities exist for the new structure to be used as a local community emergency shelter. This should include backup generator power and necessary facilities for overnight stays (kitchen and shower facilities).	Public Education & Preparedness	Emergency Preparedness	All Hazards	$700,000	Local fundraising (in addition to grants already received).	Emergency Management Committee	Additional funding sources are being sought. Completion is funding-driven at this time.	Medium
5	Beaver Dams	Actions to address beaver dams on private land that are causing flooding on public land.	Flood Hazards	Structure & Infrastructure Projects	Riverine Flood	Estimates being sought	Town budget. Possible Conservation funding.	Highway for physical labor. Inland wetlands commission for oversight	To be implemented with hiring of a consultant.	Medium
6	Miller Road Culvert Expansion	Increase capacity of Miller Road Culvert to eliminate future and repetitive damages and loss of service to roadway and provide increased conveyance of stormwater during peak flows.	Flood Hazards	Structure & Infrastructure Projects	Urban Flood	$40,000	CT DOT (if eligible for pilot program funding); HMGP in combination with PA 406 (post-disaster)	Public Works	2020 due to funding constraints and pending bonding	Low
7	Water Supply	Coordinate with the CT Water Planning Council on drought preparedness and response planning activities to ensure the Town's unique vulnerabilities to water shortages (dependency on wells for potable water, coupled with large equine population) are adequately addressed through State and local action. This includes the development of water storage tanks in multiple locations, especially in industrial areas (at minimum, the Town needs a 30,000	Regional Collaboration	Structure & Infrastructure Projects	Drought	$20,000	Federal / State / Local	Environmental Services	Through 2023 with no hard-set completion date.	Low
8	Grant Writer	Develop and hire a grant writer / resource development position for the Town.	Community Planning	Local Plans & Regulations	All Hazards	Uncertain	Town Budget	Administration	FY 2018/2019	Low

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Branford Mitigation Actions

Action #	Action Title	Action Description	Mitigation Goal	Mitigation Category	Hazard(s) Addressed	Estimated Cost	Potential Funding Source	Lead Department	Implementation Schedule	Priority
1	Linden Avenue Erosion Protection Project	Identify and construct erosion protection measures along the coastal exposure of Linden Avenue.	Flood Hazards	Structure & Infrastructure Projects	Coastal Flood; Coastal Erosion; Sea Level Rise	$5,000,000	Federal/State/Local	Engineering Department	September 2014 – September 2020	Very High
2	Meadow Street and Indian Neck Ave Flood Protection Project	Flood gates for cattle crossing on Meadow Street. Will protect area from flooding and possibly improve access during flood events.	Flood Hazards	Structure & Infrastructure Projects	Coastal Flood	$800,000	State/Federal	Engineering Department	July 2018 – September 2023	High
3	Lanphier Cove Bank Stabilization (CRP Action DB1)	Stabilize Lanphier Cove eroding bank to protect sewer infrastructure.	Flood Hazards	Natural Systems Protection	Coastal Flood; Coastal Erosion; Sea Level Rise	$175,000	Federal/State/Local	Engineering Department	July 2018 – September 2023	High
4	Waverly Road Elevation (CRP Action SC3)	Continue pursuit of home elevation on Waverly Road.	Flood Hazards	Structure & Infrastructure Projects	Coastal Flood; Sea Level Rise	$150,000 each structure	Federal/State/Local	Engineering Department	Annual Outreach Project	Medium
5	Property Acquisitions in Waverly Road/ Crouch Road Area (CRP Action SC4)	Pursue property acquisitions in Waverly Road and Crouch Road area.	Flood Hazards	Structure & Infrastructure Projects	Coastal Flood; Sea Level Rise	$300,000 each structure	Federal/State/Local	Engineering Department	Annual Outreach Project	Medium
6	Fortify Branford Trolley Trail Bridge (CRP Action SC1)	Fortify Branford Trolley Trail Bridge abutments at Stony Creek.	Public Education & Preparedness	Structure & Infrastructure Projects	Coastal Flood; Coastal Erosion; Sea Level Rise	$320,000	Federal/State/Local	Engineering Department	2018 – 2020	Medium

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East Haven Mitigation Actions

Action #	Action Title	Action Description	Mitigation Goal	Mitigation Category	Hazard(s) Addressed	Estimated Cost	Potential Funding Source	Lead Department	Implementation Schedule	Priority
1	East Haven Pump Station Resiliency Implementation Project	This project, to be led by the GNHWPCA, addresses flood resiliency at the following four (4) pump stations: Cosey Beach; Minor Road; Meadow Street; and Fairview Road. The proposed project, which has already been approved for HMGP funding, will modify the existing sanitary sewer infrastructure facilities to reduce or eliminate the long-term risk of flood damage to these pump	Flood Hazards	Structure & Infrastructure Projects	Coastal Flood; Sea Level Rise	High	FEMA HMA (HMGP)	E, FD, EM, PZ, in coordination with GNHWPCA	January 2019	Very High
2	Website Enhancement	Add pages to Town website dedicated to citizen education and preparation for natural hazard events.	Public Education & Preparedness	Education & Awareness Programs	All Hazards	Low	NA	EM	July 2018	Very High
3	ISTEA Grant for Stormwater Management	Develop an application of an Intermodal Surface Transportation Enhancement Act (ISTEA) grant for stormwater pollution mitigation; includes identification, retrofitting, and cleaning of catch basins.	Flood Hazards	Structure & Infrastructure Projects	Urban Flood	Low	ISTEA	E, TA	May/June 2018	Very High
4	Join the CRS Program	Re-apply and join the FEMA Community Rating System (CRS) program at Class 8 or better.	Flood Hazards	Local Plans & Regulations	Coastal, Riverine, and Urban Flood	Low	NA	EM	January 2019	Very High
5	Improvements to Coe Ave, Hemingway Rd, and Short Beach Rd	Investigate funding sources and feasibility of improvements to Coe Ave, Hemingway Rd, and Short Beach Rd intersection to mitigate flooding.	Flood Hazards	Structure & Infrastructure Projects	Coastal Flood; Sea Level Rise	Low	Possible - HMA	DPW; CTDOT	June 2018	Very High
6	Elevate Vulnerable Town-Owned Roadways	Investigate funding sources and feasibility of elevating portions of Town-owned roads with an emphasis on those needed for inland evacuation.	Flood Hazards	Structure & Infrastructure Projects	Coastal, Riverine, and Urban Flood; Sea Level Rise	Low	Possible - HMA	DPW	June 2018	Very High
7	Upgrade Stormwater Systems	Upgrade stormwater collection and discharge systems in downtown and coastal East Haven to keep up with rising sea level	Flood Hazards	Structure & Infrastructure Projects	Coastal and Urban Flood; Sea Level Rise	Very High	Possible - HMA	DPW	June 2018	Very High
8	Contingency Plans for Winter Storms	Identify areas that are difficult to access during winter storm events and develop contingency plans.	Public Education & Preparedness	Emergency Preparedness	Severe Winter Storm/Nor'easter	Low	Possible - HMGP4	DPW	November 2019	Very High
9	Natural Hazards Awareness Week	Continue the Natural Hazards Awareness Week.	Public Education &	Education & Awareness	All Hazards	Low	NA	EM	July 2019	High
10	Update Flood Response Plan	Revise and update the East Haven Flood Response Plan. This would complement the EOP.	Flood Hazards	Emergency Preparedness	All Hazards	Low	NA	EM	January 2020	High
11	Pre-Event Sand Bag Stockpiling	Investigate locations and necessary labor involvement for the pre-event stockpiling of sand bags for use in the flood prone downtown areas.	Flood Hazards	Emergency Preparedness	Coastal and Urban Flood	Low	NA	EM	January 2020	High
12	Promote Storm Shutters for Coastal Areas	Promote the use of shutters for properties located along the coast to guard against window breakage which can result in structural failure.	Public Education & Preparedness	Education & Awareness Programs	Severe Winter Storm/Nor'easter; Hurricane/Tropical	Low	NA	EM, B	July 2019	High
13	Evacuation Plan for Laurel Woods	Develop a site-specific evacuation plan for Laurel Woods.	Public Education &	Emergency	All Hazards	Low	NA	EM	July 2019	High
14	Update Zoning Regulations as Required for ICC	Make necessary changes to the Zoning Regulations so that all insured residents can be eligible for additional mitigation coverage through the NFIP's Increased Costs of Compliance (ICC).	Community Planning	Local Plans & Regulations	Coastal and Riverine Flood	Low	NA	PZ, EM	June 2019	High
15	Acquisition/Demolition of Flood Prone Properties	Pursue acquisition/demolition of flood prone properties for open space. RLPs should be prioritized.	Flood Hazards	Structure & Infrastructure Projects	Coastal, Riverine, and Urban Flood	High	Possible - HMA	EM, TC, TA	July 2019	High
16	Prioritize Potential Retrofit Projects for High Winds	Prioritize any wind-related retrofitting, given those buildings to be used as shelters the highest priority.	Public Education & Preparedness	Structure & Infrastructure Projects	Severe Winter Storm/Nor'easter;	Low	Possible - HMA	EM, B	March 2019	High
17	Elevation of Flood Prone Properties	Pursue elevation of residential properties that suffer flood damage; RLPs should be prioritized as the Town has done in the past.	Flood Hazards	Structure & Infrastructure Projects	Coastal, Riverine, and Urban Flood	Medium	Possible - HMA	EM, B	Ongoing	High
18	Expand Local Stream Gauge Network	Identify funding sources and install staff gauges in smaller streams such as Tuttle Brook.	Flood Hazards	Emergency Preparedness	Riverine Flood	Low	Possible - CEDAP	EM	January 2020	High

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Action #	Action Title	Action Description	Mitigation Goal	Mitigation Category	Hazard(s) Addressed	Estimated Cost	Potential Funding Source	Lead Department	Implementation Schedule	Priority
19	Mutual Aid Agreements for Emergency Response	Pursue mutual aid agreements with organizations to provide labor during flooding to fill sand bags and assist with other response activities.	Public Education & Preparedness	Emergency Preparedness	All Hazards	Low	NA	EM	January 2020	High
20	Annual Workshop on Natural Hazards	During the Natural Hazards Awareness Week, conduct an annual workshop regarding wind associated risks, retrofitting techniques, etc.	Public Education & Preparedness	Education & Awareness Programs	All Hazards	Low	NA	EM	December 2018	High
21	Backup Power for Town-Owned Buildings and Critical Facilities	Ensure that municipal departments and critical facilities have adequate backup power supply generation capabilities.	Public Education & Preparedness	Emergency Preparedness	All Hazards	High	Possible - CEDAP, State5	EM	January 2020	High
22	Underground Utilities	Pursue funding to place utilities underground in existing developments.	Community Planning	Structure & Infrastructure Projects	Severe Winter Storm/Nor'easter; Hurricane/Tropical	Very High	Possible - HMA	TC, TA	January 2020	Medium
23	Improve Shelter Lighting	Improve lighting in shelters by wiring battery conditioners to generator circuits.	Public Education & Preparedness	Emergency Preparedness	All Hazards	Low	NA	EM	January 2020	Medium
24	Satellite Shelter	Work with residents to develop a satellite shelter for residents that may become isolated during coastal flooding.	Flood Hazards	Emergency Preparedness	Coastal Flood	Low	Possible - CEDAP	EM	July 2019	Medium
25	Evacuation Protocol for Townsend Avenue Area	Work with residents and the City of New Haven to develop an evacuation protocol for East Haven residents near Townsend Avenue.	Public Education & Preparedness	Emergency Preparedness	Coastal Flood	Low	NA	EM	July 2019	Medium
26	Newcomer's Club	Develop a Newcomer's Club so that new residents may receive flood preparedness information.	Flood Hazards	Education & Awareness Programs	Coastal, Riverine, and Urban Flood	Low	NA	EM	July 2019	Medium
27	Automatic Sand Bagger	Investigate and pursue the purchase of an automated sand bagger by the town.	Flood Hazards	Emergency Preparedness	Coastal, Riverine, and Urban Flood	Low	Possible - CEDAP	EM	January 2020	Medium
28	Engineering Survey for Shelters	Request that the Town and the Board of Ed. conduct engineering surveys for shelters; recommend improvements if necessary.	Public Education & Preparedness	Emergency Preparedness	All Hazards	Low	NA	EM, B	July 2019	Medium
29	NOAA Weather Radios	Work through the State to locate NOAA weather radios in commercial buildings with large population clusters.	Public Education & Preparedness	Emergency Preparedness	All Hazards	Low	NA	EM	March 2019	Medium
30	Checklist for Land Development Applicants	Develop a checklist for land development applicants that cross references the specific regulations and codes related to disaster resilience.	Community Planning	Local Plans & Regulations	All Hazards	Low	NA	PZ, B, E, FD	July 2018	Medium
31	Promote the Availability of Flood Insurance	Incorporate information on the availability of flood insurance into all hazard-related public education workshops.	Flood Hazards	Education & Awareness Programs	Coastal, Riverine, and Urban Flood	Low	NA	EM, B	July 2020	Medium
32	Floodplain Open Space Acquisition	Pursue the acquisition of additional municipal open space in special flood hazard areas.	Flood Hazards	Natural Systems Protection	Coastal, Riverine, and Urban Flood	Very High	NA	TC, TA	Ongoing	Medium
33	Farm River Flood Mitigation	Continue to use modeling techniques to evaluate different flood mitigation options along the Farm River including floodplain storage, channel clearing, diversions, berms, dikes, bridge replacement, and culvert replacement as well as home elevations and acquisitions.	Flood Hazards	Structure & Infrastructure Projects	Riverine Flood	Low	Unlikely - HMA	EM, E	January 2020	Medium
34	Snow Removal Plan	Develop a plan to prioritize snow removal from the roof of municipal buildings (especially critical facilities) and have funding available for clearing.	Public Education & Preparedness	Emergency Preparedness	Severe Winter Storms/Nor'easter	Low	Possible - HMGP4	EM, B	July 2019	Medium
35	Flood Protection for Laurel Woods	Consider floodproofing measures for Laurel Woods Convalescent Home at 451 North High Street and/or elevate the structure.	Flood Hazards	Structure & Infrastructure Projects	Riverine and Urban Flood	High	Possible - HMA	EM	January 2020	Low
36	Limit Impermeable Surfaces in Flood Prone Areas	Review Subdivision Regulations and evaluate the possibility of incorporating changes to limit impermeable surfaces in flood prone areas.	Community Planning	Local Plans & Regulations	Riverine and Urban Flood	Low	NA	PZ	March 2019	Low
37	Stream Maintenance Regulations	Explore the possibility of adopting a series of ordinances that would place the responsibility for stream maintenance on a property owner.	Community Planning	Local Plans & Regulations	Riverine and Urban Flood	Low	NA	PZ, E	July 2020	Low

** Exported from SCRCOG's Mitigation Action Tracker, April 2018*

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Action #	Action Title	Action Description	Mitigation Goal	Mitigation Category	Hazard(s) Addressed	Estimated Cost	Potential Funding Source	Lead Department	Implementation Schedule	Priority
38	Workshop for Farm River Homeowners Association	Re-establish a relationship with the Farm River Homeowners Association and develop a workshop to educate residents in floodproofing.	Public Education & Preparedness	Education & Awareness Programs	Riverine Flood	Low	NA	EM	September 2018	Low
39	NFIP Education and Awareness for Builders, Developers, and Architects	Encourage builders, developers, and architects to become familiar with the NFIP land use and building standards by attending annual workshops.	Community Planning	Education & Awareness Programs	Coastal and Riverine Flood	Low	NA	EM, B	March 2019	Low
40	Increase Awareness of Town Plowing Routes	Consider posting the plowing routes in municipal buildings and the town website so residents and business owners may better understand risks.	Public Education & Preparedness	Education & Awareness Programs	Severe Winter Storms/Nor'easter	Low	NA	DPW	November 2018	Low
41	Floodproof the Public Works Facility	Pursue floodproofing for the Public Works Facility.	Flood Hazards	Structure &	Riverine and Urban	High	Possible - HMA	DPW	January 2020	Low
42	Floodproof the Police Department Headquarters	Pursue floodproofing for Police Department Headquarters.	Flood Hazards	Structure & Infrastructure Projects	Riverine and Urban Flood	High	Possible - HMA	PD	January 2020	Low

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Guilford Mitigation Actions

Action #	Action Title	Action Description	Mitigation Goal	Mitigation Category	Hazard(s) Addressed	Estimated Cost	Potential Funding Source	Lead Department	Implementation Schedule	Priority
1	Evacuation Signs	Acquire and install evacuation signs.	Public Education &	Emergency	Hurricane/Tropical	Low	PHEP Grant	BOS, DPW	2018	High
2	Expand Reverse 911 Coverage	Encourage the public to register their mobile phones with the reverse 911 system.	Public Education & Preparedness	Emergency Preparedness	All Hazards	Low	PHED Grant	BOS, EMA	2018	High
3	Underground Utilities	Require that utilities be placed underground in new developments.	Community Planning	Structure & Infrastructure Projects	Severe Winter Storm/Nor'easter; Hurricane/Tropical	Low	NA	PZC	2018	High
4	Revetment Repair for Marina Area	Repair stone revetment in the marina area to protect adjacent road and sidewalk.	Flood Hazards	Structure & Infrastructure Projects	Coastal Flood	Medium	Unlikely - HMA	HMC, MC	2019	High
5	Increase Funding for Tree Warden	Increase funding for the Tree Warden to address a wider range of tree limb hazards than the current budget allows.	Trees	Natural Systems Protection	Severe Winter Storm/Nor'easter; Hurricane/Tropical Storm; Extreme	Medium	Town Budget	TW, BOS	2019	High
6	Extend Public Water Supply	Extend public water supply and fire protection to Mulberry Point, Tuttles Point, and Indian Cove.	Public Education & Preparedness	Structure & Infrastructure Projects	Drought; Wildfire	Very High	Possible - DWSRF, AFGP, HMA	BOS	2018	High
7	Public Outreach and Education for Natural Hazards	Disseminate informational pamphlets regarding natural hazards to public locations and add pages to the Town website dedicated to citizen education and preparation for natural hazard events. These efforts will be aimed at promoting increased awareness and education on what businesses and property owners can do to prepare and prevent property damage and reduce injury and loss of	Public Education & Preparedness	Education & Awareness Programs	All Hazards	Low	Town	HMC, Engineering	2019	High
8	Coordinate with DOT on Flood Mitigation	Work with CT DOT to mitigate flooding problems along Route 146 at West River (upgrade bridge), Long Cove, Great Harbor/Hidden Lake (upgrade culverts) and along Leetes property.	Regional Collaboration	Structure & Infrastructure Projects	Coastal and Riverine Flood; Coastal Erosion; Sea Level Rise	Very High	State	Engineering	2018	High
9	Upgrade Community Center	Upgrade the Community Center to improve its viability as one of two primary shelters. Contract Engineer to inspect building and create recommendations regarding structural integrity for different storm events.	Public Education & Preparedness	Structure & Infrastructure Projects	All Hazards	High	Possible - HMA, CEDAP, EOC	BOS, EMA, DPR	2020	Medium
10	CRS Participation	Consider enrolling in the Community Rating System.	Flood Hazards	Local Plans & Regulations	Coastal and Riverine Flood	Low	NFIP (insurance benefits only)	BOS, Engineering	2018	Medium
11	Improve Egress for Indian Cove	Create design plans to elevate Daniel Avenue or West Lane to provide multiple modes of egress for Indian Cove residents.	Public Education & Preparedness	Local Plans & Regulations	All Hazards	High	Possible - HMA	DPW	2021	Medium
12	Elevate Low Spots on Chimney Corner Road	Create design plans to elevate low spots on Chimney Corner Road.	Flood Hazards	Structure & Infrastructure Projects	Coastal Flood; Coastal Erosion; Sea Level Rise	High	Unlikely - HMA	DPW	2023	Medium
13	Erosion Control Study	Conduct study of erosion control alternatives at Jacobs Bch, Chittenden Bch, Grass Is., and Chaffinch Is; create conceptual designs; implement feasible/prudent alternatives.	Community Planning	Local Plans & Regulations	Coastal Flood; Coastal Erosion; Sea Level Rise	High	Unlikely - HMA	HMC, DPW	2019	Medium
14	Construct Walkways for Areas of Erosion Concern	Construct pile-supported walkways where foot traffic is exacerbating erosion.	Flood Hazards	Structure & Infrastructure Projects	Coastal Flood; Coastal Erosion; Sea Level Rise	High	Unlikely - HMA	HMC, DPW, B&E	2021	Medium
15	Municipal Roof Load Study	Conduct a study to identify municipal buildings, critical facilities, and others that are vulnerable to roof damage or collapse due to heavy snow.	Community Planning	Local Plans & Regulations	Severe Winter Storm/Nor'easter	Medium	Possible – HMGP; Capital Budget	DPW, B&E	2019	Medium
16	Incorporate Dam Failure Areas into Reverse 911 System	Include dam failure areas in the Reverse 911 emergency contact database.	Public Education & Preparedness	Emergency Preparedness	Dam Failure	Low	NA	EMA	2018	Medium
17	Inspections for Town-owned Dams	Conduct formal inspections of Town-owned dams, especially Lake Quonnipaug Dam.	Public Education & Preparedness	Structure & Infrastructure Projects	Dam Failure	Low	NA	Engineering	2019	Medium
18	Living Shoreline for Chittenden Beach	Chittenden Beach living shoreline – Develop permit-level plans with required studies to obtain permits from CT DEEP and USACE.	Flood Hazards	Natural Systems Protection	Coastal Flood; Coastal Erosion; Sea Level Rise	Medium	Grants	Natural Resources, Harbor Management	2020	Medium

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Action #	Action Title	Action Description	Mitigation Goal	Mitigation Category	Hazard(s) Addressed	Estimated Cost	Potential Funding Source	Lead Department	Implementation Schedule	Priority
19	Relocate Public Works Facility	Relocate the Public Works Facility outside a flood zone and hurricane surge zone.	Flood Hazards	Structure & Infrastructure Projects	Coastal Flood	Very High	Possible - HMA, EOC	BOS, DPW	2023	Low
20	Mutual Aid for Brown's Boat Yard	Develop mutual aid agreement with Brown's Boat Yard to enable its assistance prior to disasters. Town to assist boat yard in locating upland storage area.	Public Education & Preparedness	Emergency Preparedness	All Hazards	Low	NA	BOS, HMC	2023	Low
21	Mutual Aid for Guilford Boat Yard	Develop mutual aid agreement with Guilford Boat Yard to enable its assistance prior to disasters. Town to assist boat yard in locating upland storage area.	Public Education & Preparedness	Emergency Preparedness	All Hazards	Low	NA	BOS, HMC	2023	Low
22	H&H Modeling for West River Watershed	Develop hydrologic and hydraulic model of the West River watershed as a way to prioritize mitigation activities such as culvert and bridge upgrades, property acquisitions and elevations, and retention/detention.	Flood Hazards	Local Plans & Regulations	Coastal and Riverine Flood	Medium	NA	B&E, DPW	2023	Low
23	Infrastructure Upgrades along West River	Upgrade bridges and culverts along West River south of Lake Quonnipaug.	Flood Hazards	Structure & Infrastructure Projects	Coastal and Riverine Flood	High	Unlikely - HMA	DPW	2023	Low
24	Drainage Improvements for Munger Brook	Improve drainage and Munger Brook flood conveyance in the area that floods between County Road and Route 80.	Flood Hazards	Structure & Infrastructure Projects	Riverine Flood	Medium	Possible - HMA	DPW	2023	Low
25	Elevation of Whitfield Street	Create design plans to elevate Whitfield Street from Seaview Terrace to the entrance of the marina to minimize flooding and improve drainage.	Flood Hazards	Structure & Infrastructure Projects	Coastal and Urban Flood; Coastal Erosion; Sea Level Rise	High	Possible - HMA	DPW	2023	Low
26	Elevate Low Spots on Seaside Avenue	Create design plans to elevate selected locations along Seaside Avenue.	Flood Hazards	Structure & Infrastructure Projects	Coastal and Urban Flood; Coastal Erosion;	High	Unlikely - HMA	DPW	2023	Low
27	Accommodate Migration of Tidal Wetlands	Set aside sufficient land for landward migration of tidal wetlands.	Flood Hazards	Natural Systems Protection	Coastal Flood; Coastal Erosion; Sea Level Rise	Very High	Bonds	BOS	2018	Low
28	Assistance and Outreach to Dam Owners	Provide technical assistance and outreach to owners of private Class B and Class C dams regarding inspections and maintenance.	Public Education & Preparedness	Education & Awareness Programs	Dam Failure	Low	NA	Engineering	2019	Low
29	Evaluate Unclassified Dams	Evaluate and classify the seven unranked dams in Guilford.	Public Education &	Structure &	Dam Failure	Low	NA	Engineering	2019	Low
30	Public Outreach for Wildfire Hazards	Continue to support public outreach programs to increase awareness of forest fire danger, equipment usage, and protecting homes from wildfires.	Public Education & Preparedness	Education & Awareness Programs	Wildfire	Low	NA	FD	2018	Low
31	Phragmites Control	Develop a program of phragmites control that minimizes fires (work with CT DEEP on Phragmites Control Projects).	Trees	Natural Systems Protection	Wildfire	Medium	NA	FD, Natural Resources	2020	Low

Lead Departments: BOE = Board of Education; BOS = Board of Selectmen; B&E = Buildings and Engineering Department; DPR = Department of Parks and Recreation; DPW = Department of Public Works; EMA = Emergency Management Agency; FD = Fire Department; HMC = Hazard Mitigation Commission; PZC = Planning and Zoning Commission; TW = Tree Warden.

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Hamden Mitigation Actions

Action #	Action Title	Action Description	Mitigation Goal	Mitigation Category	Hazard(s) Addressed	Estimated Cost	Potential Funding Source	Lead Department	Implementation Schedule	Priority
1	FEMA Flood Study Update - Part II	Update FEMA flood study for Hamden using LIDAR technology.	Community Planning	Local Plans &	Riverine Flood	$55,000	FEMA	FEMA	September 2020	High
2	Skiff Street Bridge Replacement	Replace Skiff Street bridge with a wider one that will reduce upstream flooding.	Flood Hazards	Structure & Infrastructure Projects	Riverine Flood	$8,300,000	Fed/Local	Hamden Engineering	September 2017 – September 2019	High
3	Promote Nature-Based Solutions for Hazard Mitigation	Promote the conservation and stewardship of green infrastructure within the Town, including a vibrant tree canopy, to reduce flooding and minimize the urban heat island effect. This includes identifying and supporting increased tree planting and proper tree maintenance	Trees	Natural Systems Protection	Severe Winter Storm/Nor'easter; Hurricane/Tropical Storm; Urban Flood; Extreme Temperatures	N/A (staff time and in-kind contributions from HTA)	N/A	Tree Commission, in coordination with Hamden Tree Alliance	Through 2023	High
4	Tree Pruning	Tree pruning adjacent to power distribution wires.	Trees	Natural Systems Protection	Severe Winter Storm/Nor'easter; Hurricane/Tropical Storm; Severe	$50,000	United Illuminating and its contractors	United Illuminating	September 2019	Medium
5	Snow Load Study	Study town buildings to determine snow removal criteria.	Community Planning	Local Plans & Regulations	Severe Winter Storm/Nor'easter	$30,000	Local Capital Budget	Town of Hamden	June 2021	Medium
6	Raise Paradise Avenue South of Howard Drive	Raise Paradise Avenue south of Howard Drive.	Flood Hazards	Structure & Infrastructure Projects	Riverine and Urban Flood	$500,000 - 1,000,000	Local Capital Budget	Town of Hamden	September 2021	Medium
7	Replace Mill River Pump Station	Replace Mill River Pump Station	Flood Hazards	Structure &	Riverine and Urban	$15,000,000	Local Capital Budget	Hamden Engineering	September 2022	Medium
8	Educational Outreach on Tree Preservation	Develop and conduct an outreach campaign to increase the education and awareness of citizens on what they can do to help preserve, maintain, and protect healthy trees throughout Hamden.	Trees	Natural Systems Protection	Severe Winter Storm/Nor'easter; Hurricane/Tropical Storm; Urban Flood;	$10,000	Local Capital Budget	Tree Commission, in coordination with Hamden Tree Alliance	Through 2023	Medium
9	Integrate Hazard Mitigation with Tree Preservation Planning	Develop an action plan to significantly increase tree planting, caring for these newly planted trees (including watering when necessary), and protecting our existing healthy trees. Emphasize the essential services that trees provide, which includes natural hazard risk reduction	Trees	Natural Systems Protection	Severe Winter Storm/Nor'easter; Hurricane/Tropical Storm; Urban Flood; Extreme Temperatures	$5,000	Local Capital Budget	Tree Commission, in coordination with Hamden Tree Alliance	Through 2023	Medium

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Madison Mitigation Actions

Action #	Action Title	Action Description	Mitigation Goal	Mitigation Category	Hazard(s) Addressed	Estimated Cost	Potential Funding Source	Lead Department	Implementation Schedule	Priority
1	Radio Infrastructure Improvements	New dispatch consoles; microwave connectivity between towers; simulcast to allow communication for both towers simultaneously; new tower.	Public Education & Preparedness	Emergency Preparedness	All Hazards	$1,500,000	General Municipal Funds	Police Department	Expected Completion in October 2017	Very High #1
2	Adopt A 1-Foot Freeboard Requirement in the Floodplain Management Ordinance (CRP Action TR3)	Adopt the FEMA suggested 1-foot freeboard requirement in the next update of the Floodplain Management Ordinance.	Flood Hazards	Local Plans & Regulations	Coastal and Riverine Flood	N/A	N/A (absorbed into existing departmental funding)	Floodplain Administrator / Town Engineer	0 - 1 year	Very High #2
3	Expand the Definition of 'Substantial Improvement' in the Floodplain Management Ordinance to Include Improvements Made Over Five Years (CRP Action TR4)	Adopt a five-year 'look back period' to further efforts to bring non-complying structures into compliance with the FEMA construction standards.	Flood Hazards	Local Plans & Regulations	Coastal and Riverine Flood	N/A	N/A (absorbed into existing departmental funding)	Floodplain Administrator / Town Engineer	0 - 1 year	Very High #3
4	Generator Installation at Town and School Facilities	Install new generators at critical municipal facilities.	Public Education & Preparedness	Emergency Preparedness	All Hazards	Varied based on location	FEMA Hazard Mitigation Assistance Funding	Emergency Management	0 - 5 years	Very High #4
5	Utilize Municipal GIS Program in Hazard Mitigation Planning Efforts	Utilize GIS to map areas that are at risk of flooding, identify local evacuation routes, etc.	Community Planning	Local Plans & Regulations	All Hazards	$2,500	Municipal Funding Sources	Emergency Management	0 - 2 years	Very High #5
6	Middle Beach Road Revetment (CRP Action MBR1)	Rehabilitation of an approximate 750-foot-long stone revetment along Middle Beach Road.	Flood Hazards	Structure & Infrastructure Projects	Coastal Flood; Coastal Erosion; Sea Level Rise	$600,000	FEMA Hazard Mitigation Grant Program	Public Works and Engineering	5 - 10 years	High
7	Garvin Point Bulkhead (CRP Action SC2)	Rehabilitation of an approximate 280-foot-long steel sheet pile bulkhead at Garvin Point.	Flood Hazards	Structure & Infrastructure Projects	Coastal Flood; Coastal Erosion; Sea Level Rise	$400,000	FEMA Hazard Mitigation Grant Program	Public Works and Engineering	0 - 5 years	High
8	East River Flood Mitigation	Installation of a flood control structure adjacent to the East River.	Flood Hazards	Structure & Infrastructure Projects	Coastal Flood; Coastal Erosion; Sea Level Rise	$500,000	Emergency Watershed Program/USDA Natural Resources Conservation Service	Public Works and Engineering	5 - 10 years	High
9	Surf Club Dune Restoration (CRP Action SC2)	Restoration of coastal dune at Surf Club Recreation Facility.	Flood Hazards	Natural Systems Protection	Coastal Flood; Coastal Erosion; Sea Level Rise	$200,000	FEMA Hazard Mitigation Grant Program	Public Works and Engineering	0 - 5 years	High
10	Review Suitability of Town Facilities for Alternate Shelter Locations	Evaluate the suitability of other municipal facilities to serve as shelters during storm events.	Public Education & Preparedness	Structure & Infrastructure Projects	All Hazards	N/A	N/A (absorbed into existing departmental funding)	Emergency Management	0 -2 years	High
11	Update Stormwater Management Regulations	Adopt new stormwater management regulations and Low Impact Development (LID) standards into the Town of Madison Planning & Zoning Regulations to help address issues stemming from routine rain events.	Flood Hazards	Local Plans & Regulations	Urban Flood	N/A	N/A (absorbed into existing departmental funding)	Engineering and Land Use	0 -1 years	High
12	Incorporate a stand-alone hazard mitigation section in the Plan of Conservation and Development (POCD)	Highlight hazard mitigation actions more prominently in the next update of the Plan of Conservation and Development (POCD).	Community Planning	Local Plans & Regulations	All Hazards	N/A	N/A (absorbed into existing departmental funding)	Land Use	Coordinated with required 2023 update	Medium
13	Circle Beach Road Maintenance Standards (CRP Action CB1)	Determine appropriate road maintenance standards for Circle Beach Road in recognition of repetitive damage due to flooding and storm surge.	Flood Hazards	Structure & Infrastructure Projects	Coastal Flood; Coastal Erosion; Sea Level Rise	N/A	N/A (absorbed into existing departmental funding)	Emergency Management	0 -2 years	Medium
14	Implement public outreach efforts to ensure residents are adequately prepared for natural hazard events.	Employ various communication measures (website, email, etc.) to help residents be prepared for natural hazard event.	Public Education & Preparedness	Education & Awareness Programs	All Hazards	N/A	N/A (absorbed into existing departmental funding)	Emergency Management	0 -2 years	Medium
15	Identify Hazard Mitigation Structure and Infrastructure Projects in the Five-Year Capital Plan	Ensure that proposed hazard mitigation projects are included in the five-year capital plan.	Community Planning	Structure & Infrastructure Projects	All Hazards	N/A	N/A (absorbed into existing departmental funding)	Public Works and Engineering / Finance Department	Completed by July 1, 2018	Medium

SCRCOG Jurisdiction-Specific Mitigation Actions
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Action #	Action Title	Action Description	Mitigation Goal	Mitigation Category	Hazard(s) Addressed	Estimated Cost	Potential Funding Source	Lead Department	Implementation Schedule	Priority
16	Form a Hazard Mitigation Plan Steering Committee and Report Annually to the Board of Selectmen	Convene a Hazard Mitigation Plan Steering Committee to periodically review hazard mitigation priorities and actions.	Community Planning	Local Plans & Regulations	All Hazards	N/A	N/A (absorbed into existing departmental funding)	Office of the First Selectman	Upon plan adoption	Medium
17	Increase Town Wide Tree & Limb Maintenance Budget to Limit Road Blockage and Power Outages During Storms (CRP Action PP2)	Increase funding for municipal tree and limb maintenance.	Trees	Natural Systems Protection	Severe Winter Storm/Nor'easter; Hurricane/Tropical Storm; Urban Flood; Extreme Temperatures	$15,000 - $25,000	Municipal Funding Sources	Public Works and Engineering / Finance Department	Completed by July 1, 2018	Medium
18	Update Emergency Operations Plan Annually	Perform annual updates of the Local Emergency Operations Plan.	Public Education & Preparedness	Emergency Preparedness	All Hazards	N/A	N/A (absorbed into existing departmental funding)	Emergency Management	Annually	Medium
19	Plan for Extended Outages	Plan for extended periods of outages as part of routine emergency preparedness planning and incorporate efforts to be more self-reliant during such events	Public Education & Preparedness	Emergency Preparedness	All Hazards	N/A	N/A (absorbed into existing departmental funding)	Emergency Management	Annually	Medium
20	Compile first floor elevation data for houses in the flood zone	Through a combination of research and field work, compile first floor elevation data for all homes within the flood zone.	Flood Hazards	Local Plans & Regulations	Coastal and Riverine Flood	N/A	N/A (absorbed into existing departmental funding)	Building Department	0 - 2 years	Low

** Exported from SCRCOG's Mitigation Action Tracker, April 2018*

SCRCOG Jurisdiction-Specific Mitigation Actions
2018-2023

Milford Mitigation Actions

Action #	Action Title	Action Description	Mitigation Goal	Mitigation Category	Hazard(s) Addressed	Estimated Cost	Potential Funding Source	Lead Department	Implementation Schedule	Priority
1	300 KW Fuel Cell-Housatonic WWTP	Provide continuing heat and power supply to sewage treatment plant.	Public Education & Preparedness	Emergency Preparedness	All Hazards	$4,000,000	Grant funding	Wastewater	2 years: December 2020	High
2	Annual Survey and Monitoring for Woodmont Beach (required by ACOE)	Woodmont Beach study and investigate erosion control, repair/replacement of shoreline storm drains and sand replenishment. This amount will be used to fund the study only.	Community Planning	Natural Systems Protection	Coastal Flood; Coastal Erosion; Sea Level Rise	$10,000	Grant funding	DPW	Annual	High
3	Wepawaug River Pond Dredging/Dam and Shore Rehabilitation	Dredge Wepawaug River Ponds (North St. (upper) Duck Pond, City Hall (lower) Duck Pond, and Prospect Street Pond). Repair dams and shore walls. The ponds have been filled with silt and debris which threatens wildlife and habitats. Lack of sediment storage behind dams is causing siltation of the harbor requiring frequent dredging. Dredging, dam and shore repair has not been done in	Flood Hazards	Natural Systems Protection	Coastal Flood; Coastal Erosion; Sea Level Rise	$2,100,000	Bonds	DPW	4-5 years: November 2107 - November 2018	High
4	Gulf Beach	Gulf Beach maintenance and sand replenishment as needed.	Flood Hazards	Natural Systems Protection	Coastal Flood; Coastal Erosion; Sea Level Rise	$40,000	Grant funding	DPW	Annual (seasonal)	High
5	Milford Harbor	Dredging of Milford's Inner Harbor, Federal Channel, and Federal Anchorage.	Flood Hazards	Natural Systems Protection	Coastal Flood; Coastal Erosion; Sea Level Rise	$3,850,000	Federal funds and TBD	ACOE & Harbor Commission	5 years: December 2020	High
6	Walnut /Wildemere Beach (CRP Action WW3)	Coastal resiliency plan and permitting project for sand replenishment and outfall replacement /repair.	Flood Hazards	Natural Systems Protection	Coastal Flood; Coastal Erosion; Sea Level Rise	$525,000	CDBG-DR State and Federal funds	DPW	3-5 years: November 2016 - September 2019	High
7	Gulf Street & Welchs Point Road Bluff Stabilization	The natural earth bluff was eroded by Storm Sandy. If it continues to erode, it will expose the underground utilities and endanger the asphalt road. Planning and permitting project only.	Flood Hazards	Natural Systems Protection	Coastal Flood; Coastal Erosion; Sea Level Rise	$275,000	CDBG-DR State and Federal funds	DPW	3-5 years: November 2016 - November 2018	High
8	Bayview Beach Area Flooding Study and Drainage Improvements (CRP Action BB2)	Bayview Beach Area Flooding Study and Drainage Improvements in the area of Field Court. The proposed planning, permitting, and construction project will mitigate flooding dangers in the area and provide safer access through the streets.	Flood Hazards	Structure & Infrastructure Projects	Coastal Flood; Coastal Erosion; Sea Level Rise	$1,726,150	CDBG-DR State and Federal funds	DPW	3-5 years: October 2016 - June 2019	High
9	Beachland Avenue Road Elevation (CRP Action MC3)	Elevate the lower portion of Beachland Avenue to mitigate flooding.	Flood Hazards	Structure & Infrastructure Projects	Coastal Flood; Coastal Erosion; Sea Level Rise	$638,250	CDBG-DR State and Federal funds	DPW	3-5 years: November 2016 - November 2018	High
10	Crescent Beach Resiliency (CRP Action BW2 and BW3)	Analysis of resiliency options for the Woodmont Crescent Beach. The proposed project is a three-part project that will include a survey and analysis of Crescent Beach and the surrounding area, a planning stage, and a final design stage. Grant # 6206, Expiration 2/28/2019	Flood Hazards	Structure & Infrastructure Projects	Coastal Flood; Coastal Erosion; Sea Level Rise	$225,000	CDBG-DR State and Federal funds	DPW	1-2 years: June 2019	High
11	Pelham Street (Bay Street-paper street) Public Access Resiliency (CRP Action MC6 and MC7)	Analysis of resiliency options to stabilize bluff and protect public access at the base of the Bay Street (paper street). Planning and permitting project only.	Flood Hazards	Natural Systems Protection	Coastal Flood; Coastal Erosion; Sea Level Rise	$150,000	CDBG-DR State and Federal funds	DPW	1-2 years: June 2019	High
12	Eisenhower Park Pond - Wepawaug River Dredging/Dam Spillway Rehabilitation	Dredge Wepawaug River Pond at Eisenhower Park. Repair dams and shore walls. The pond has been filled with silt and debris which threatens wildlife and habitats. Dredging, dam and spillway repair has not been done in several decades.	Flood Hazards	Natural Systems Protection	Coastal Flood; Coastal Erosion; Sea Level Rise	$1,545,000	Grant funding	DPW	3-5 years: November 2021 - November 2023	High
13	Gulf Beach Breakwater (CRP Action GB-1)	Design Plan, Permitting and construction of a stone breakwater to protect Gulf Beach from sand erosion and sediment accumulation in Milford Harbor.	Flood Hazards	Structure & Infrastructure Projects	Coastal Flood; Coastal Erosion; Sea Level Rise	$503,500	CDBG-DR State and Federal funds	DPW	5 years: September 2014 - September 2019	High

SCRCOG Jurisdiction-Specific Mitigation Actions
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Action #	Action Title	Action Description	Mitigation Goal	Mitigation Category	Hazard(s) Addressed	Estimated Cost	Potential Funding Source	Lead Department	Implementation Schedule	Priority
14	Morningside Bluff, Seawall and Revetment (CRP Action MH1 and MH2)	Repair of Morningside revetment to protect Morningside Drive and infrastructure. Construction of a seawall to stabilize the eroding bluff.	Flood Hazards	Structure & Infrastructure Projects	Coastal Flood; Coastal Erosion; Sea Level Rise	$1,180,480	CDBG-DR State and Federal funds	DPW	5 years: September 2014 - September 2019	High
15	Beaver Brook WWTP Flood Control Project (CRP Action SS1)	WWTP processes 25% of the City's Sewage and portions of the facility are located in the zone AE (10). Proposal to protect the infrastructure and functioning of the plant.	Flood Hazards	Natural Systems Protection	Coastal Flood; Sea Level Rise	$2,000,000	Federal Funds & TBD	DPW	3-4 years: December 2021 - December 2022	High
16	Pump Station Flood Mitigation	Milford has 40 pump stations for its sanitary sewer system. Pump stations to be reviewed to enhance equipment for improving resiliency.	Flood Hazards	Structure & Infrastructure Projects	Coastal and Urban Flood; Sea Level Rise	$200,000	Grant funding	Wastewater	3-5 years: November 2021 - November 2023	High
17	Microgrid Project	To provide power resilience to Parsons Government Center, City Hall, Harborside Middle School, Federal Senior Housing, and Milford Senior Center facilities in the event of a power loss.	Public Education & Preparedness	Structure & Infrastructure Projects	All Hazards	$4,500,000	CT DEEP Grant	DPW	2 years: October 2017 - October 2019	High
18	Milford Point Road Elevation Project (CRP Action MP-1)	The road elevation project will mitigate street flooding occurring during lunar tides and provide a pedestrian sidewalk and boardwalk section. Planning and permitting project only.	Flood Hazards	Structure & Infrastructure Projects	Coastal Flood	$501,537	CDBG-DR State and Federal funds	DPW	4 years: 2018 – 2022	High
19	CIRCA Walnut Beach Dune Restoration Project (CRP Action WW6)	This project is managing invasive vegetation in the Walnut Beach Dune and restoring native dune plantings. This will enhance dune resilience, improve habitat and enhance aesthetics.	Flood Hazards	Natural Systems Protection	Coastal Flood; Coastal Erosion; Sea Level Rise	$7,830	CIRCA Grant (UConn and DEEP)	Open Space & Natural Resource Agent	2 years: January 2017 - June 2018	High
20	NRCS Emergency Floodplain and Watershed Protection Program (EWP/FPE) (CRP Action PA1)	Acquisition of 84 Cooper Avenue.	Flood Hazards	Structure & Infrastructure Projects	Coastal Flood; Sea Level Rise	$140,000	NRCS EWP/FPE Grant	NRCS	2019	High
21	Elevation of Sailors Lane Pump Station	Project to elevate the generator and equipment on Sailors Lane.	Flood Hazards	Structure & Infrastructure Projects	Coastal Flood; Sea Level Rise	$200,000	CDBG	DPW	2015 - April 2018	High
22	Debris Management Site Acquisition	Proposed 10-acre industrial land adjacent to the City's Transfer site on Oronoque Road is being considered for purchase for disaster debris management.	Public Education & Preparedness	Emergency Preparedness	All Hazards	$1,300,000	Grant funding	DPW	2018	High
23	Eisenhower Park Environmental/Existing Renovations	Environmental reclamation, natural resource & recreational improvement, floodplain and water quality improvement, park maintenance and park security.	Community Planning	Natural Systems Protection	Coastal and Riverine Flood	$380,000	Grant funding	Recreation	5 years: September 2023	Medium
24	Flax Mill Lane Bridge Repair	Rehabilitation and repairs to the deck, piers and abutments to the Flax Mill Lane Bridge over the Wepawaug River. The bridge was constructed in 1935 and has been identified as requiring work to maintain its structural integrity and aesthetic charm.	Flood Hazards	Structure & Infrastructure Projects	All Hazards	$2,500,000	State	DPW - Engineering	1-2 years: August 2019	Medium
25	Tumblebrook Flood Control Study	Commission study to control flooding along Tumblebrook which flows approximately 3,000 linear feet from the Orange town line to Route 1 (Boston Post Road). Watershed encompasses over 500 acres of densely developed and populated area. Flooding occurs in heavy rains affecting many homes and flooding on Route 1.	Flood Hazards	Local Plans & Regulations	Riverine Flood	$30,000	Grant funding	DPW	4-5 years: November 2019 - November 2023	Medium
26	City-Wide Flood Zone Warning System Upgrade	Flood gauge and flood warning system upgrades town wide.	Flood Hazards	Emergency Preparedness	Coastal and Riverine Flood	$125,000	Grant funding	Emergency management	3-5 years: November 2021 - November 2024	Medium
27	IT Infrastructure	Where appropriate and when available the City needs to upgrade IT, mapping and communications infrastructure. This will give capabilities to mitigate and assess hazard risks and perform public outreach.	Public Education & Preparedness	Emergency Preparedness	All Hazards	$100,000	Grant funding	MIS	5 years: August 2023	Medium

SCRCOG Jurisdiction-Specific Mitigation Actions
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Action #	Action Title	Action Description	Mitigation Goal	Mitigation Category	Hazard(s) Addressed	Estimated Cost	Potential Funding Source	Lead Department	Implementation Schedule	Priority
28	Coastal Resiliency for Areas Outside Existing Resiliency Projects	Milford has approximately 17 miles of coastline. Many low-lying shoreline neighborhoods are prone to flooding and shoreline erosion. Some have benefited from resiliency projects. Others are undergoing study. This project would review the remaining areas.	Community Planning	Local Plans & Regulations	Coastal Flood; Coastal Erosion; Sea Level Rise	500,000	Grant funding	DPW	2-4 years: August 2020 - August 2022	Medium

SCRCOG Jurisdiction-Specific Mitigation Actions
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New Haven Mitigation Actions

Action #	Action Title	Action Description	Mitigation Goal	Mitigation Category	Hazard(s) Addressed	Estimated Cost	Potential Funding Source	Lead Department	Implementation Schedule	Priority
1	Long Wharf Flood Protection	Implement flood protection recommendations from Long Wharf Flood Protection study including living shoreline, deployable flood dams at I-95 underpasses, and planning and design of permanent flood wall.	Flood Hazards	Structure & Infrastructure Projects	Coastal Flood; Sea Level Rise	>$5,000,000	FEMA, USACE, and others	Board of Alders with City Plan	7/2019-6/2021	Very High
2	Downtown Green Infrastructure	Installation of green infrastructure within the downtown drainage area to alleviate pressure on the storm sewer system. Roughly 200 locations have been identified throughout the Downtown drainage area. This is considered Phase 2 of the Tranche 2 funding. Phase I is the implementation of the proposed alternative recommended in the Downtown Stormwater Modeling study. Of the $4 million received in Tranche 2 funding, roughly $2.5 million will be used for installation of green infrastructure and the remaining for the implementation of the stormwater modeling study's recommended alternative.	Flood Hazards	Natural Systems Protection	Urban Flood	$2,500,000	CDBG - DR (Tranche 2)	Engineering Department	8/2016- 6/2019	Very High
3	Quinnipiac River riprap repairs	Repair of existing riprap and seawall.	Flood Hazards	Structure &	Coastal Flood	$300,000	Capital improvement	Parks Department	7/2018-6/2019	Very High
4	Lighthouse Point Park Carousel Building Floodproofing.	Floodproof existing Carousel Building to higher elevation in park to eliminate any future flooding of building.	Flood Hazards	Structure & Infrastructure Projects	Coastal Flood	$1- $2 million	FEMA, CDBG-DR, others	Parks Department	TBD	Very High
5	City Point Flood Mitigation Measures Implementation.	Implement recommendations of City Point flood mitigation study.	Flood Hazards	Structure & Infrastructure Projects	Coastal Flood	>$5,000,000	TBD	TBD	TBD	Very High
6	CSO Clean Water Fund projects	Several projects proposed: 1. Installation of approximately 75 bioswales for CSO reduction within the West River Watershed 2. CSO Closure and Regulator Improvements at Quinnipiac/Clifton Street, George/Temple Street, and Mitchell Drive 3. Union Street and East Street Pump Station Upgrades 4. Yale Campus Trumbull Street Area Sewer Separation Phase 2A 5. West River CSO Improvements at Orange Street, Ella T. Grasso Boulevard, and Whalley Avenue 6. Union Street Downtown Crossing CSO Improvements 2018	Flood Hazards	Structure & Infrastructure Projects	Coastal, Riverine, and Urban Flood	$145,200,000 (total)	Multiple: CWF/Blended Grant Loans/ Sewer Lining Loans (see note above under estimated costs).	GNHWPCA	All projects to be completed by 2022	Very High
7	Mill River	Implement recommendations of the Mill River planning study that forecast storm surge and sea level rise within the Mill River Industrial District and then to assess three coastal zone management approaches: natural attenuation, intensive infrastructure investment and a balance of new infrastructure with attenuation.	Flood Hazards	Structure & Infrastructure Projects	Coastal and Riverine Flood	>$5,000,000	FEMA, USACE, and others	Board of Alders with Engineering, Public Works, City Plan, and Economic Development	7/2019-6/2021	Very High
8	Dam failure drill with Regional Water Authority	Work with Regional Water Authority to complete a drill of potential failures of the West River, Whitney, and Maltby Dams which are all located upstream of the City.	Regional Collaboration	Emergency Preparedness	Dam Failure	Less than $5,000 per year	Operating budget	Emergency Management	8/2017-7/2018 for first year, then annually	Very High
9	Implementation of CRS Program for Public Information	The City Plan Department must ensure that the City makes progress in the many action items in the PPI. Emergency Management will coordinate and lead Public Information Meetings at public libraries within Quinnipiac, East Shore and City Point neighborhoods to review the CRS rating system, the city's flood mitigation strategies, and flood preparedness.	Public Education & Preparedness	Education & Awareness Programs	Coastal Flood; Sea Level Rise	Less than $5,000 per year	Operating budget	City Plan and Emergency Management	7/2016-6/2017 for first year, then annually	Very High

SCRCOG Jurisdiction-Specific Mitigation Actions
2018-2023

Action #	Action Title	Action Description	Mitigation Goal	Mitigation Category	Hazard(s) Addressed	Estimated Cost	Potential Funding Source	Lead Department	Implementation Schedule	Priority
10	Beach Nourishment South of Pardee Seawall	Beach nourishment in front of private homes on Townsend Avenue for flood prevention.	Flood Hazards	Natural Systems Protection	Coastal Flood; Coastal Erosion; Sea Level Rise	$1,800,000	CDBG-DR	Engineering Department	10/2017-5/2019	High
11	River Street Bulkhead	Shoreline stabilization along city property to prevent further erosion along the Quinnipiac River including sections of steel bulkhead and revetments with public access.	Flood Hazards	Structure & Infrastructure Projects	Coastal Flood; Coastal Erosion; Sea Level Rise	Analysis and design budget is $342,000; Construction budget is $3 million (preliminary)	CDBG-DR for analysis and design/TBD for construction	Economic Development Administration	TBD	High
12	Downtown Stormwater Modeling and Drainage System Improvements Project	Hydraulic study of the Downtown area including Union Avenue and the Route 34 underpasses. The result of this study will inform the sewer system improvements to be made. The proposed alternative will be implemented through the design of another project that will be funded through CDBG-DR grant Tranche 2 (roughly $1.5 million allocated so far).	Flood Hazards	Structure & Infrastructure Projects	Urban Flood	$350,000	CDBG-DR (Tranche 1)	Engineering Department	Began in 2015; complete by 6/2019	High
13	Church Street South Residential Planning and Demand Analysis	During Hurricane and other storm surges, excessive flooding occurs along Church Street South making it an extremely vulnerable community for residents and visitors. The scope of the Residential Planning and Demand analysis will determine the most sustainable residential and mixed-use structure(s) to be developed based on the area's need and will leverage existing planning initiatives included in the storm water and flood mitigation studies as well as the Community Plan to determine a viable mix of housing and commercial developments for the redeveloped property.	Community Planning	Local Plans & Regulations	Coastal and Urban Flood	$500,000	CDBG-DR	Livable Cities Initiative	Uncertain (still TBD)	High
14	Morris Cove Drainage Improvement Project	Redirection of existing drainage to improve conveyance of stormwater flow.	Flood Hazards	Structure & Infrastructure Projects	Coastal and Urban Flood	$400,000	Capital improvement	Engineering Department	7/2018-6/2019	High
15	Fort Hale Park drainage outlet rehabilitation	Restoration and silt removal from an existing drainage channel. Requires access to the Armed Forces Reserve Center but would solve a drainage problem for residents near the USCG facility.	Flood Hazards	Structure & Infrastructure Projects	Coastal and Urban Flood	In kind from DEEP to dredge outlets as part of mosquito control.	Capital improvement	Parks Department	7/2018-6/2019	High
16	East Shore Park shoreline stabilization	Living Shoreline solutions are being studied, including: segmented sills with marsh fringe, regrading and vegetating waterfront slopes with armored toe, and improving public access to the waterfront.	Flood Hazards	Natural Systems Protection	Coastal Flood; Coastal Erosion; Sea Level Rise	Approximately $500,000.	CIRCA; City operating budget	Parks Department	7/2018-6/2019	High
16	Criscuolo Park seawall	Install wall along shoreline of park to prevent flooding of park.	Flood Hazards	Structure & Infrastructure Projects	Coastal Flood	$750,000	Capital improvement	Parks Department	7/2018-6/2019	High
16	Lighthouse Point Park Carousel Building Floodproofing Study.	Conduct feasibility study to floodproof Carousel building to higher elevation in park to eliminate any future flooding of building.	Flood Hazards	Structure & Infrastructure Projects	Coastal Flood; Sea Level Rise	$50,000	Operating budget	Parks Department	TBD	High
16	Fort Hale Park shoreline stabilization	Install riprap and other shoreline stabilization measures.	Flood Hazards	Structure & Infrastructure Projects	Coastal Flood; Coastal Erosion; Sea Level Rise	$225,000	Capital improvement	Parks Department	7/2018-6/2019	High
16	City Point Flood Mitigation Study	A study to prepare storm surge and sea level rise model for the City Point area to assess risk and propose protection and resilience strategies.	Community Planning	Local Plans & Regulations	Coastal Flood	$425,000	TBD	City Plan	7/2017-8/2018	High

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North Branford Mitigation Actions

Action #	Action Title	Action Description	Mitigation Goal	Mitigation Category	Hazard(s) Addressed	Estimated Cost	Potential Funding Source	Lead Department	Implementation Schedule	Priority
1	Installation of Generator at Police Station	Installation of Replacement Stand-by Generator at North Branford Police Station.	Public Education & Preparedness	Emergency Preparedness	All Hazards	$75,000	FEMA/DEEP	Emergency Operations / Police Department	April 2018-October 2018	High
2	Installation of Generator at Firehouse #1	Installation of Replacement Stand-by Generator at Company #1 Firehouse.	Public Education & Preparedness	Emergency Preparedness	All Hazards	$50,000	FEMA/DEEP	Emergency Operations / Fire Department	February 2018-August 2018	High
3	Tree Removal	Removal of trees alongside roads and power lines.	Trees	Natural Systems Protection	Severe Winter Storm/Nor'easter;	$50,000	State of CT / Utilities / Local	DPW with State of CT / Utilities	Annual / Recurring Action	High
4	Farm River Flood Control Project	Construction of Farm River Flood Controls. Building a dam behind police station would help East Haven and North Branford – consideration should be given to a reduced project scope	Flood Hazards	Structure & Infrastructure Projects	Riverine Flood	$2,000,000 - 4,000,000	DEEP / NRCS / Town	NRCS / DEEP / FEMA	(Undetermined (still TBD)	Medium
5	Public Education and Outreach	Increase public awareness regarding the potential for flooding, the areas to be affected, the need for and availability of flood insurance.	Public Education & Preparedness	Education & Awareness Programs	Riverine Flood	$40,000	Federal/State/Local	Engineering Department	July 2018-June 2023	Medium
6	Removal or Elevation of Structures	Remove or elevate existing structures in flood prone areas.	Flood Hazards	Structure & Infrastructure Projects	Riverine Flood	$50,000 - $500,000	FEMA / DEEP	Engineering Department	Undetermined (still TBD)	Medium
7	Culvert replacement at Arthur Road	Upgrade / Replace existing undersized culverts.	Flood Hazards	Structure & Infrastructure Projects	Riverine and Urban Flood	$250,000-500,000	DOT	Engineering Department	July 2020-October 2021	Medium
8	Upgrade bridge at Harrison Road	Upgrade / Replace existing bridge structure.	Flood Hazards	Structure & Infrastructure Projects	Riverine and Urban Flood	$500,000-750,000	DOT	Engineering Department	July 2021-October 2022	Medium
9	Elevate Route 80/West Pond Road Intersection	Elevate West Pond Road Extension in vicinity of Route 80.	Flood Hazards	Structure & Infrastructure Projects	Riverine and Urban Flood	$200,000	State of CT / Local	Engineering Department	July 2022-October 2023	Medium
10	Add CERT Team	Development and training of a CERT team.	Public Education & Preparedness	Emergency Preparedness	All Hazards	$10,000	State of CT	Emergency Management	July 2020-July 2021	Medium
11	Open Space Acquisition	Open space acquisition.	Flood Hazards	Natural Systems Protection	Riverine Flood	$50,000 - $500,000	DEEP / Local	Town Manager	Undetermined (still TBD)	Low

SCRCOG Jurisdiction-Specific Mitigation Actions
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North Haven Mitigation Actions

Action #	Action Title	Action Description	Mitigation Goal	Mitigation Category	Hazard(s) Addressed	Estimated Cost	Potential Funding Source	Lead Department	Implementation Schedule	Priority
1	Emergency Generators	Emergency Generators.	Public Education & Preparedness	Emergency Preparedness	All Hazards	$100,000	FEMA Hazard Mitigation Grant Program	Fire Department	2018-2023 (in progress)	Very High
2	Pine River Road Project	Pine River Road homes flood due to the Muddy River overflowing.	Flood Hazards	Structure & Infrastructure Projects	Riverine Flood	$1,700,000	Federal/State/Local	DPW	2019-2023 (delayed)	Medium
3	Patten Road Project	Remedy flooding of Patten Road due to the Muddy River.	Flood Hazards	Structure & Infrastructure Projects	Riverine and Urban Flood	$1,000,000 - 5,000,000	CT DEEP and Town	DPW	2018-2023 (already partially completed)	Medium
4	Develop and Distribute Materials to Promote Back Flow Prevention Devices	Back flow systems have been installed on a couple of homes – could use additional education – such as flyers with sewer bills to recommend back flow systems for all homes	Public Education & Preparedness	Education & Awareness Programs	Urban Flood	Low	Town	DPW	2018-2023 (in progress)	Medium
5	Public Education on Dumping in Streams and Other Drainage Systems	Education needed about not dumping into streams – don't dump dog poop, leaves, trash, etc.	Public Education & Preparedness	Education & Awareness Programs	Riverine Flood	Low	Town	DPW	2018-2023 (in progress)	Medium
6	Inform Public of Charge in FEMA Mapping (May 16, 2017)	Education needed to let people know that they are now in a flood zone.	Public Education & Preparedness	Education & Awareness Programs	Riverine Flood	Low	Town and FEMA	DPW	2018-2023 (in progress)	Medium

SCRCOG Jurisdiction-Specific Mitigation Actions
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Orange Mitigation Actions

Action #	Action Title	Action Description	Mitigation Goal	Mitigation Category	Hazard(s) Addressed	Estimated Cost	Potential Funding Source	Lead Department	Implementation Schedule	Priority
1	Tree Pruning and Removal	Continue to ensure proper tree pruning and removal along roadsides. Town roads have trees hanging over roadways. Hurricane winds could cause massive road closures and power outages.	Trees	Natural Systems Protection	Severe Winter Storm/Nor'easter; Hurricane/Tropical Storm; Severe	Moderate	Grant funding (Federal/State/Local)	Town of Orange, Highway Department	July 2018-June 2023	Very High #1
2	EMAC Meetings	Hold EMAC meetings once a month to include discussions on mitigation planning.	Community Planning	Local Plans & Regulations	All Hazards	Low	Town Funding	Emergency Management	July 2018-June 2023	Very High #2
3	Mallard Drive Access Improvements	Improve access to Mallard Drive neighborhood which becomes isolated during flood events. Currently can only be accessed from rear through retail plaza.	Flood Hazards	Structure & Infrastructure Projects	Flood	High	Grant funding (Federal/State/Local)	Town of Orange, Highway Department	July 2018-June 2023	Very High #3

SCRCOG Jurisdiction-Specific Mitigation Actions
2018-2023

Wallingford Mitigation Actions

Action #	Action Title	Action Description	Mitigation Goal	Mitigation Category	Hazard(s) Addressed	Estimated Cost	Potential Funding Source	Lead Department	Implementation Schedule	Priority
1	Generator at Well No. 1 Production Well	Install emergency generator at the Well No. 1 production well to maintain water supply to the Town's system during power outages.	Public Education & Preparedness	Emergency Preparedness	All Hazards	$60,000	Post-disaster Mitigation Funds	Water Division	12 months	High
2	Trunked Radio System	Need better interoperability for communication.	Public Education &	Emergency	All Hazards	$6,000,000	Local	PD/FD	12-18 months	High
3	Emergency Response Planning and Exercising	Need to plan and exercise response to incidents.	Public Education & Preparedness	Emergency Preparedness	All Hazards	N/A (staff time)	Local	PD/FD	3-12 Months	High
4	Generator at High School	Install emergency generator at the High School to support primary shelter.	Public Education & Preparedness	Emergency Preparedness	All Hazards	$500,000	Post-disaster Mitigation Funds	Civil Preparedness/EM	N/A	Medium
5	Enhance Public Notification System	Everbridge – have the system but people don't sign up. Design outreach program to encourage register.	Public Education & Preparedness	Emergency Preparedness	All Hazards	N/A (staff time)	N/A	PD/FD	Through 2023	Medium
6	Maintaining Waterway	Coordination with DEEP on Warehouse Point (debris is raising water levels along Quinnipiac River).	Flood Hazards	Natural Systems Protection	Riverine Flood	N/A (staff time)	N/A	TBD	Through 2023	Low

SCRCOG Jurisdiction-Specific Mitigation Actions
2018-2023

West Haven Mitigation Actions

Action #	Action Title	Action Description	Mitigation Goal	Mitigation Category	Hazard(s) Addressed	Estimated Cost	Potential Funding Source	Lead Department	Implementation Schedule	Priority
1	Install Mechanized Tide Gates at Captain Thomas Boulevard on Cove River	Existing tide gates are deteriorated and not functioning properly. New self-regulating gates will provide better flow both upstream and downstream to reduce flooding and environmental enhancement of the tidal marsh.	Flood Hazards	Structure & Infrastructure Projects	Coastal Flood; Sea Level Rise	$3,000,000	Federal / State / Local	Public Works	January 2019 - June 2020	High
2	Upgrade Sewage Pump Stations	Two pump stations are on the beach and below the 100-year base flood elevation. Six others are below the 100-year base flood elevation. These stations need to be upgraded to make them functional during storm events.	Flood Hazards	Structure & Infrastructure Projects	Coastal Flood; Sea Level Rise	$18,700,000	Federal / State / Local	Public Works	July 2018 - June 2023	High
3	Outfall Pipe Reconstruction	Existing outfall pipe from Water Pollution Control Plant built in 1968 is in danger of damage due to exposure to daily tidal flows and storms and requires lowering to be under the seabed and needs enlarging to carry flows due to expected sea level rise.	Flood Hazards	Structure & Infrastructure Projects	Coastal Flood; Sea Level Rise	$22,000,000	Federal / State / Local	Public Works	January 2019 - December 2022	High
4	Raise Beach Street Phase 2	Phase 2 will raise the Beach Street from Phase 1 terminus to Morse Avenue. This will provide access during storms and reduce flooding in the area.	Flood Hazards	Structure & Infrastructure Projects	Coastal Flood	$6,000,000	Federal / State / Local	Public Works	January 2019 - June 2020	High
5	Nourish Beach and Dune Restoration at Savin Rock Beach	Construct dune and nourish beach to protect the properties from frequent flooding during storms. Install crossovers on the dune for beach access and prevent dune damage.	Flood Hazards	Natural Systems Protection	Coastal Flood	$6,000,000	Federal / State / Local	Public Works	January 2019 - March 2020	High
6	Evaluate Road Access to Promote Economic Development of Commercial Properties in Floodplain	Evaluate access during the 100-year flood to commercial districts along Beach Street and Captain Thomas Boulevard. Determine inaccessible areas under current conditioning. Evaluate steps to provide access. Examine feasibility and costs - make recommendations.	Community Planning	Local Plans & Regulations	Coastal and Urban Flood	$65,000	Federal/State/Local	Planning and Development	September 2018 - September 2019	High
7	Property Buyout 3rd Avenue Extension	Buy properties on 3rd Avenue Extension, Blohm Street in the Old Field Creek Floodplain and demolish houses.	Flood Hazards	Structure & Infrastructure Projects	Coastal Flood	$2,000,000	Federal	DPW/Planning	2018 - 2023	Medium
8	Beach and Dune Management	Develop a beach and dune management plan to keep them in good condition for protection from flood hazards.	Community Planning	Natural Systems Protection	Coastal Flood; Coastal Erosion; Sea Level Rise	$50,000	Federal / State / Local	Public Works	January 2020 - October 2020	Medium
9	Sediment Basin at Peck Avenue	Construct sediment basin at Peck Avenue crossing of Old Field Creek to trap sediments.	Flood Hazards	Structure & Infrastructure Projects	Coastal and Riverine Flood	$10,000	Local	Public Works	June 2020	Medium
10	Bayview Condos and First Avenue East Shoreline Green Infrastructure	Bayview Condominiums sit on a bluff with steep eroding slope causing hazard to the condominium. Slope stabilization with green infrastructure will reduce the hazard.	Public Education & Preparedness	Natural Systems Protection	Coastal Erosion	$500,000	Federal / State / Local	Public Works	June 2019 - June 2020	Medium
11	Study, design, and construct Cove River channel and retention basin at Greta Street and West Spring Street	West Spring Street and Greta Street intersection floods during rain storms and affects adjacent properties. Upstream retention basin will reduce flooding.	Flood Hazards	Structure & Infrastructure Projects	Urban Flood	$2,500,000	Federal / State / Local	Public Works	January 2020 - December 2022	Medium
12	Improve bridge and channel on Cove River at Main Street and Painter Drive	Reconstruct bridge and lower utilities below the bed for better flow conveyance. Improve channel and enlarge culvert under driveway to apartments.	Flood Hazards	Structure & Infrastructure Projects	Riverine Flood	$2,000,000	Federal / State / Local	Public Works / State DOT	January 2022 - June 2023	Medium
13	Implement Woodruff Street Seawall Repair and Upgrade	Raise 100' of seawall by 2' and stabilize backyard to reduce erosion. This section gets damaged and yard eroded during storms.	Flood Hazards	Structure & Infrastructure Projects	Coastal Flood	$100,000	Federal / State / Local	Public Works	March 2020 - September 2020	Medium
14	Implementation of Floodplain Development Fee	Research BMPs of other municipalities using development fees. Develop draft concept for program. Review with local officials and business to determine how project could work for West Haven and appropriate fees. Work with Council and administration to implement development fee.	Flood Hazards	Local Plans & Regulations	Coastal and Riverine Flood	$20,000	Federal/State/Local	Planning and Development	December 2019 - December 2020	Medium

SCRCOG Jurisdiction-Specific Mitigation Actions
2018-2023

Action #	Action Title	Action Description	Mitigation Goal	Mitigation Category	Hazard(s) Addressed	Estimated Cost	Potential Funding Source	Lead Department	Implementation Schedule	Priority
15	Adoption of Changes to Zoning Regulations	Review BMPs for relaxing height restrictions in the 100-year floodplain. Consider changes to "lookback period" in substantial improvements definition. Review BMPs of neighboring municipalities regarding freeboard in excess of 1 foot. Final step would be to develop list of text amendments, review with Planning and Zoning Commission, and schedule for public hearing and	Community Planning	Local Plans & Regulations	Coastal and Riverine Flood	$25,000	Local	Planning and Development	December 2020 - December 2021	Low
16	Installation of Signs to Educate the Public	Develop educational sign concept. Identify key locations. Develop design. Obtain public and commission review. Have signs manufactured. Install signs in key locations. Publicize through press releases and city website.	Public Education & Preparedness	Education & Awareness Programs	All Hazards	$25,000	Federal/State/Local	Planning and Development	December 2021 - December 2022	Low
17	Join CRS (CRP Action Pr6)	Assess joining the FEMA Community Rating System (CRS) Program.	Community Planning	Local Plans & Regulations	Coastal, Riverine, and Urban Flood	Low	City / Department Operating Budget	Planning & Development Department	July 2020 - June 2021	Low
18	Coastal Resilience Education and Training for City Staff (CRP Action Ed1)	Perform education and training programs for municipal personnel and staff to identify nexuses between their areas of responsibility and coastal resilience.	Public Education & Preparedness	Education & Awareness Programs	Coastal Flood; Coastal Erosion; Sea Level Rise	Low	City / Department Operating Budget; NBOC	Mayor	July 2020 - June 2021	Low

SCRCOG Jurisdiction-Specific Mitigation Actions
2018-2023

Woodbridge Mitigation Actions

Action #	Action Title	Action Description	Mitigation Goal	Mitigation Category	Hazard(s) Addressed	Estimated Cost	Potential Funding Source	Lead Department	Implementation Schedule	Priority
1	Address Repetitive Loss Properties	A total of seven (7) repetitive loss properties have been recorded by FEMA with locations in Woodbridge. The Town shall review and validate the data provided for these properties, and as appropriate, will analyze the causes of flooding in the repetitive loss areas and evaluate potential mitigation strategies. This may include but is not limited to an outreach project to those addresses in repetitive loss areas to inform them of potential financial assistance for flood mitigation projects. Currently under NFIP policies. Severity of impact might be reduced due to remedial efforts downstream.	Flood Hazards	Education & Awareness Programs	Riverine Flood	$1,000,000	N/A	TPZ/Building	July 2018 – July 2023	Medium
2	Generator for Animal Shelter	Current building is being modified with an addition. Generator and/or transfer switch needed.	Public Education & Preparedness	Emergency Preparedness	All Hazards	$100,000	Grant	Animal Control	July 2018 – July 2019	Low

APPENDIX E. MITIGATION PLAN EVALUATION WORKSHEETS

MITIGATION ACTION PROGRESS REPORT

Mitigation Action Progress Report				
Progress Report Period	From Date		To Date	
Action/Project Title				
Responsible Agency				
Contact Name				
Contact Phone/Email				
Project Description				
Project Goal				
Project Objective				
Project Cost				
Project Status				
Date of Project Approval	Date of Project Start	Anticipated Date of Completion	Project Canceled	Project Delayed
Explanation of Delay or Cost Overruns				

Project Report Summary
What was accomplished for this project during this reporting period?
What obstacles, problems, or delays did the project encounter?
Plans for next reporting period.

MITIGATION ACTION REVIEW WORKSHEET

Plan Section	Considerations	Explanation
Planning Process	Should new jurisdictions and/or districts be invited to participate in future plan updates?	
	Have any internal or external agencies been invaluable to the mitigation strategy?	

Plan Section	Considerations	Explanation
	Can any procedures (e.g., meeting announcements, plan updates) be done differently or more efficiently?	
	Has the Advisory Committee undertaken any public outreach activities?	
	How can public participation be improved?	
	Have there been any changes in public support and/or decision-maker priorities related to hazard mitigation?	
Capability Assessment	Have jurisdictions adopted new policies, plans, regulations, or reports that could be incorporated into this plan?	
	Are there different or additional administrative, human, technical, and financial resources available for mitigation planning?	
	Are there different or new education and outreach programs and resources available for mitigation activities?	
	Has NFIP participation changed in the participating jurisdictions?	
Risk Assessment	Has a natural and/or technical or human-caused disaster occurred?	

Plan Section	Considerations	Explanation
	Should the list of hazards addressed in the Plan be modified?	
	Are there new data sources and/or additional maps and studies available? If so, what are they and what have they revealed? Should the information be incorporated into future plan updates?	
	Do any new critical facilities or infrastructure need to be added to the asset lists?	
	Have any changes in development trends occurred that could create or reduce risks?	
	Are there repetitive losses and/or severe repetitive losses to document?	
Mitigation Strategy	Is the mitigation strategy being implemented as anticipated? Were the cost and timeline estimates accurate?	
	Should new mitigation actions be added to the Action Plan? Should existing mitigation actions be revised or removed from the plan?	
	Are there new obstacles that were not anticipated in the plan that will need to be considered in the next plan update?	

Plan Section	Considerations	Explanation
	Are there new funding sources to consider?	
	Have elements of the plan been incorporated into other planning mechanisms?	
Plan Maintenance Procedures	Was the plan monitored and evaluated as anticipated?	
	What are needed improvements to the procedures?	

HAZUS-MH REPORTS UNDER SEPARATE COVER

Included under separate cover due to their size.