

# Historic Preservation And Resiliency Planning In Connecticut

Strengthening state and local plans in an era of climate change

✓Prepare ✓Withstand ✓Recover ✓Adapt



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**Historic Preservation and Resiliency Planning in  
Connecticut  
Strengthening state and local plans in an era of climate change**

**Final**



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# LIST OF ABBREVIATIONS

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AIC-CERT – American Institute for Conservation – Collections Emergency Response Team  
BFE – Base Flood Elevation  
CFR – Code of Federal Regulations  
CIRCA - Connecticut Institute for Resiliency and Climate Adaptation  
COGs - Councils of Government  
CRP – Coastal Resilience Plan  
DECD – Department of Community and Economic Development  
DEEP – Department of Energy and Environmental Protection  
DEMHS – Department of Emergency Management and Homeland Security  
DESPP – Department of Emergency Services and Public Protection  
DOI – U.S. Department of Interior  
EMD – Emergency Management Department  
EOP – Emergency Operations Plans  
EPA - Environmental Protection Agency  
FEMA – Federal Emergency Management Agency  
GIS – Geographic Information System  
HMA – Hazard Mitigation Assistance  
HMP – Hazard Mitigation Plan  
HMGP – Hazard Mitigation Grant Program  
IPCC – Intergovernmental Panel on Climate Change  
LIS – Long Island Sound  
NFIP – National Flood Insurance Program  
NHR – National Heritage Responders  
NOAA – National Oceanic and Atmospheric Administration  
NPS – National Park Service  
NRCS – Natural Resources Conservation Service  
OPM – Office of Policy and Management  
POCD - Plan of Conservation and Development  
PPC – Point of Public Contact  
P&Z – Planning and Zoning  
SFHA – Special Flood Hazard Area  
SHPO - State Historic Preservation Office  
SHPP – State Historic Preservation Plan  
SLR – Sea Level Rise  
SRF - Connecticut State Response Framework  
UCONN – University of Connecticut

# CHAPTER I

## INTRODUCTION

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The Connecticut State Historic Preservation Office (SHPO) developed this report on historic resource resilience planning to assist state and local planners and to engage a wider audience in a discussion of preservation planning needs in an era of climate change. The report summarizes the SHPO's efforts to integrate historic preservation concerns into resiliency planning in Connecticut and offers recommendations for incorporating preservation values in the resiliency planning process.

Undertaken as part of the SHPO's Hurricane Sandy program, the report is one component of a three-year program of data collection and analysis, outreach, and technical assistance in the state's four coastal counties, which received federal disaster declarations after Superstorm Sandy. As the state agency charged with overseeing historic preservation for Connecticut's citizens, the SHPO administers a range of federal and state programs for the identification, registration, and protection of buildings, sites, structures, districts, and objects that constitute Connecticut's cultural heritage.

After Sandy struck much of the East Coast in 2012, the U.S. Department of the Interior awarded disaster relief and recovery funds to the SHPO through the Emergency Supplemental Historic Preservation Fund of the National Park Service (authorized by Public Law 113-2, the Disaster Relief Appropriations Act). Among the agency's priorities for the NPS grant was the proactive consideration of historic properties in local plans and protocols for hazard and resiliency planning in areas affected by Superstorm Sandy. To support this objective, the project team of R. Christopher Goodwin & Associates, Dewberry, and Milone & MacBroom carried out a progressive program of data collection and mapping; outreach to planning officials in the four-county target area; audits of existing plans; and the development of a best practices guide for integrating historic resource preservation and natural hazard resilience. The SHPO also recognized the benefits of exploring and expanding the consideration of historic properties in local resiliency planning in the remainder of the state; of integrating historic preservation into state-level resiliency planning and initiatives; and of addressing historic resource resiliency in the Connecticut State Historic Preservation Plan (2018).

Four key steps—prepare, withstand, recover, and adapt—generally are employed by hazard mitigation planners working on federal, state, and local levels. This approach presents opportunities to address historic preservation concerns at all stages. Federal Emergency Management Agency (FEMA 2005) guidance for hazard mitigation planning was adopted in this project and tailored to the study area to:

- Assess risks by mapping identified resources and overlaying hazard data (FEMA flood zones, hurricane surge areas, etc.) relative to existing and future high-risk areas;
- Develop a mitigation plan focusing on the four coastal Connecticut counties most affected by recent Storms Irene and Sandy (Fairfield, New Haven, Middlesex, and New London);

- Undertake planning outreach in communities in the four counties to integrate historic resource consideration into other planning, hazard mitigation, and emergency management planning documents;
- Organize resources by building strategic partnerships with local municipalities and emergency management personnel; and,
- Provide a framework to implement the plan, monitor progress, and update data as needed.

The number of historic properties at risk was illustrated by correlating geospatial data for heritage resources with map data for hazard areas. Integrating historic property data with existing mapped data offered a powerful tool for understanding current and future risks to historic resources from storms, sea level rise, and other hazards (Chapter III).

Direct outreach to regional Councils of Government (COGs) and municipalities in the state's four coastal counties was undertaken to assist with resiliency planning and to advance consideration of historic properties at the COG level and in the community planning process. Ninety-one (91) localities were reached through the COGs, and additional coordination was undertaken with 28 municipalities in the four-county coastal area (Chapter II).

The SHPO provides oversight, education, and guidance for historic preservation in Connecticut, but it recognizes the critical role of local governments in preservation and land use decisions and as first responders during events and in disaster recovery. At the same time, the COGs recognize that natural hazards are not confined by political boundaries and that regional hazard mitigation planning, regional coastal resiliency studies, and regional emergency planning initiatives are most effective in addressing threats. Recent NPS work evaluating structural and nonstructural adaptation strategies for managing resources within the National Park system informed recommendations for historic resource resiliency strategies in Connecticut (Chapter IV).

The built environment shapes the identities of Connecticut's towns and cities, offering tangible evidence of the state's history. Many of Connecticut's oldest places are in river valleys and coastal areas that increasingly are vulnerable to flooding, cyclonic storms, nor'easters, and sea level rise. Achieving resiliency for historic resources intersects with community resiliency through the four key steps: prepare, withstand, recover, and adapt (fig. 1). Although this project focused on the "prepare" phase of the resiliency cycle at the local level in Connecticut's coastal counties, state-level resiliency planning efforts also were analyzed, and recommendations were developed for the integration of historic preservation concerns into those plans.

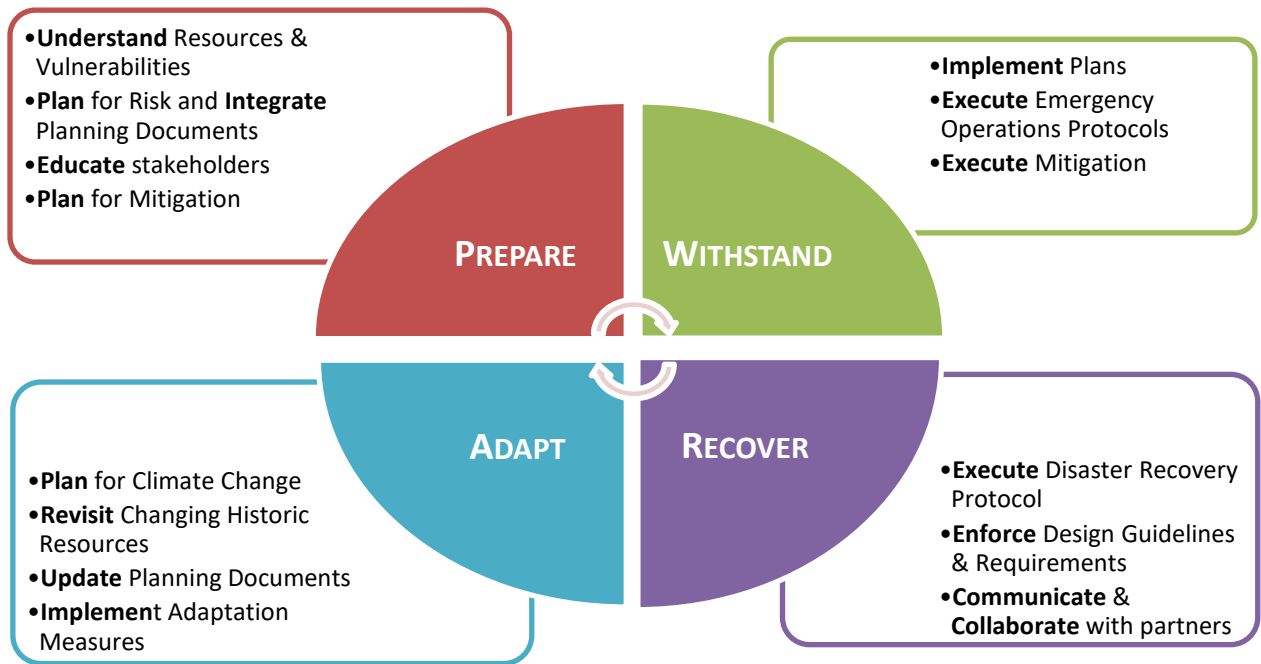


Fig. 1. Steps for achieving resiliency for historic resources.

# PREPARE: METHODOLOGY FOR HISTORIC RESOURCE RESILIENCE PLANNING

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Integrating historic preservation concerns in community resiliency planning requires a proactive approach to:

- promote effective planning for local historic resources within the larger context of hazard planning;
- support local communities in establishing local preservation priorities;
- integrate historic resources in disaster recovery protocols; and
- contribute to community cohesion during the recovery and adaptation phases of the resiliency cycle following an event.

This study focused on the integration of historic preservation values in the “prepare” phase of the resiliency cycle at the local level. Project milestones were:



### Data Collection

Formatting existing historic resource data to be compatible with the data management system used by local resiliency planners was a priority. Such compatibility allows municipalities to integrate historic resource information with other data sets used in decision making. Data management using a geographic information system (GIS) is standard in the planning field. This map-driven approach allows for the integration of large volumes of divergent data sets, making sophisticated analyses and planning possible.

The SHPO’s historic resource data, including documentation from the National Historic Landmark, National Register, State Register, and local landmark programs, were in hard-copy formats that emphasized narrative descriptions and statements of significance. In 2016 the project team converted this documentation to database and GIS formats, compiling data sets and baseline mapping in GIS for previously identified historic resources within the hazard zones of the four counties.

At the same time, the team assembled conservation and development plans, zoning regulations and ordinances, hazard mitigation plans, historic preservation ordinances, coastal resiliency plans, and emergency operations plans from the 91 communities in the four coastal counties. The team then completed a “gap analysis” of those documents to determine how each municipality considered historic resources in planning and disaster preparedness. The results were reviewed in meetings with the five coastal Councils of Government (COGs) (Table 1).

**Table 1. Councils of Government Meetings**

<b>Council of Government (COG)</b>	<b>Meeting Date</b>
Southeastern Connecticut Council of Governments	June 8, 2016
Southcentral Regional Council of Governments	June 9, 2016
Connecticut Metropolitan Council of Government	June 20, 2016
Western Connecticut Council of Governments	June 23, 2016
Lower Connecticut River Valley Council of Governments	June 29, 2016

## Charrettes

In June 2016 the resiliency planning team led a series of charrettes for local and regional planners within the boundaries of the five coastal COGs. The meetings focused on the nature and identification of historic resources, benefits of historic preservation and designation, risks facing coastal historic resources, specific local and regional challenges, and measures to integrate historic resources into community planning practices and documents.

Questions posed to community representatives and discussed at the charrettes included:

- Where do municipal planning documents and codes address historic resources?
- Where do municipal planning documents and codes address hazards?
- What are the barriers to incorporating hazard resiliency of historic resources into municipal planning documents and codes?
- How do the life cycles of planning documents and codes affect the ability to incorporate hazard resiliency into historic resources?
- What are specific actions, strategies, codes, or ordinances that could be added to municipal documents and codes to improve the resiliency of historic resources to natural hazards?
- What municipal personnel need to be engaged to make changes?

**Table 2. Town Meetings**

<b>Town</b>	<b>Meeting Date</b>
Greenwich	September 13, 2017
Stamford	November 30, 2016
Darien	November 16, 2016
Norwalk	March 27, 2017
Westport	May 25, 2017
Fairfield	February 1, 2017
Bridgeport	October 26, 2016
Stratford	June 23, 2017
Milford	February 6, 2017
West Haven	January 19, 2017
New Haven	February 6, 2017
East Haven	March 23, 2017
Branford	January 25, 2017
Guilford	January 25, 2017
Madison	January 25, 2017
Clinton	November 28, 2016
Westbrook	November 28, 2016
Old Saybrook	November 29, 2016
Borough of Fenwick	November 28, 2016
Old Lyme	January 26, 2017
East Lyme	November 21, 2016
New London	November 8, 2016
Waterford	November 21, 2016
Groton, City	November 8, 2016
Groton – Long Point	November 22, 2016
Noank	November 22, 2016
Stonington	November 6, 2016
Stonington Borough	November 9, 2016

## Town Meetings

The charrettes were followed by meetings in each of the 28 coastal communities to review the gap analyses and discuss integration of historic resources into community planning (Table 2). Each municipality received a written assessment of its planning documents completed under the gap analysis and a summary of the challenges to historic

**Sample Guidance**  
**Building Historic Resources into Hazard Mitigation Plans**  
**Townville, CT**

**Critical Facilities: Historic and Cultural Resources**

Historic and cultural resources include districts, sites, buildings, structures, and objects that are significant in history, architecture, archaeology, engineering, and culture (National Trust for Historic Preservation). In its 2014-2017 Strategic Plan, the Connecticut Trust for Historic Preservation explains that protection of these resources grows economies, enhances community character, and highlights our cultural heritage. FEMA report 386-6, Integrating Historic Property and Cultural Resource Considerations Into Hazard Mitigation Planning, published in 2005, states that the loss of irreplaceable historic and cultural resources, including buildings, artwork, monuments, heirlooms, and documents, can be particularly painful because “residents rely on their presence after a disaster to reinforce connections with neighbors and the larger community, and to seek comfort in the aftermath of a disaster.” Consideration of these resources in this Hazard Mitigation Plan is critical.

The importance of historic resources to Townville is written into the Town’s Plan of Conservation and Development. The Townville historical society points to the following buildings that are listed on the National Historic Register:

- Rushing Creek Mill Building
- Townville Town Hall
- Old Elementary School
- Union Station

*Historic preservation planning allows for the protection of historic properties and cultural resources before they are threatened with demolition or alteration. Hazard mitigation planning allows for the protection of life and property from damage caused by natural and manmade hazards. Integrating these two planning processes will help to ensure the future growth of safe and sustainable historic communities.*

- FEMA Report 386-6, May 2005

Other historic and cultural resources in Townville may be listed on State or Local Registers.

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

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

Fig. 2. Sample guidance provided to towns.

## State Historic Preservation Plan Update

The Connecticut State Historic Preservation Plan (SHPP) identifies the preservation goals, objectives, and strategies to advance the state’s program and is updated every five years. The 2018 plan is the first to address resiliency planning for historic preservation. The SHPP is informed by findings from the charrettes, community gap analyses, and town meetings held in 2016-17.

resources to inform planning efforts (fig. 2). Each municipality also received GIS data for their historic resources to assist its planning efforts.

## **Best Practices Guide**

Information from the regional planning agency charrettes, the 28 municipal planning meetings, and examples of best practices from other U.S. communities were synthesized and summarized in a Best Practices Guide for all municipalities in Connecticut. This guide provides community and regional planners with tools to integrate historic resources into resiliency planning and with resources for technical assistance. The Best Practices Guide also includes guidance for municipal planners on sources for sample regulatory and planning language to plan for the protection of historic resources. The Best Practices Guide will be available to municipalities in hard copy and will be posted at the Connecticut SHPO’s website/e-library.



## CHAPTER III

# HISTORIC RESOURCES IN COASTAL CONNECTICUT AND THEIR VULNERABILITY

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### Overview of Historic Resources in Coastal Connecticut

The resiliency planning study focused on the four coastal counties of Connecticut that received federal disaster declarations after Superstorm Sandy, including municipalities directly along Long Island Sound and communities along several of the state’s prominent rivers where they empty into Long Island Sound (Housatonic, Connecticut, Thames).

The Connecticut shoreline and river corridors, which are anticipated to be the areas most vulnerable to hazards such as increased flooding and sea level rise, are rich in natural resources. Historically, they provided fertile lands for agriculture and ample access to other food sources. They have supported human habitation ranging from the state’s earliest Paleoindian sites through colonial settlements to contemporary towns. Today these areas support the majority of the state’s population.

Historic properties are defined as buildings, sites, structures, districts, and objects that possess the significance and integrity necessary for listing on the National Register of Historic Places (36 CFR 60.4 [a-d]). Connecticut also maintains a State Register of Historic Places that recognizes properties considered historic. The criteria for listing on the State Register are similar to, but not identical to, those required for National Register consideration. For purposes of this study, “historic resources” encompassed properties designated as National Historic Landmarks, those listed in the National Register of Historic Places and the State Register of Historic Places, and properties recognized through local historic preservation ordinances. Archaeological sites were excluded, owing to the sensitivity of the locational data associated with this class of historic property.

The National Park Service adopted a more holistic definition of cultural resources in its publication *Cultural Resources Climate Change Strategy* (U.S. Department of Interior 2016). Four categories in the NPS classification—archaeological sites, cultural landscapes, ethnographic landscapes, buildings and structures—were applied in this report for the resource risk analysis, which is based on the NPS model.

### Historic Resource Types

#### Archaeological Sites

Archaeological sites tell Connecticut’s story across time from its first human inhabitants. Such sites provide physical evidence of past human occupation or activity and encompass both pre-Contact and historic archaeological sites. These sites contribute to our understanding of the lands first encountered by people, how those lands changed over time, and how Connecticut’s first residents adapted to their environment (fig. 3).

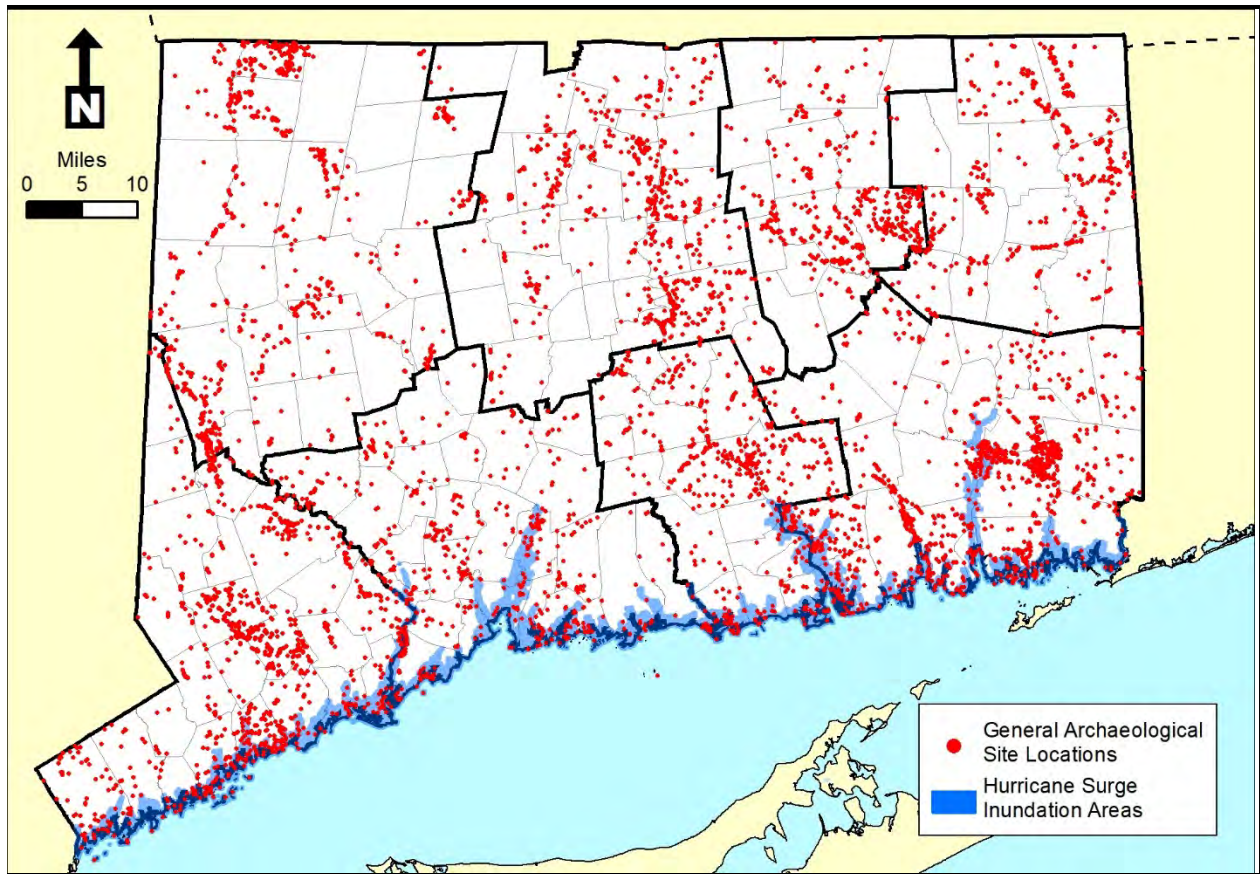


Fig. 3. Map showing archaeological sites within hurricane surge inundation areas (Source: RCG&A/FEMA).

Connecticut was relatively uninhabitable until Ice Age glaciers receded 15,000 to 13,200 years ago. Paleoindians migrated to the area about 11,500 to 9,000 years ago. These first inhabitants were nomadic, focusing on hunting and gathering plants and nuts for subsistence. The Archaic period (9,000–2,700 B.P.) witnessed the development of seasonal settlements clustered around large wetlands and along major rivers that were supported by seasonal hunting forays to other areas. The Woodland period (3,000 B.P.–500 B.P. [ca.1500]) was characterized by the establishment of hamlets and the introduction of horticulture and then active agriculture. Several Native American populations were concentrated along the coast and major rivers of Connecticut. Storm-related erosion of coastal areas poses an imminent threat to archaeological sites, including oyster shell middens, or mounds, along coastal areas, and the former locations of longhouses, other shelters, and Native American activity areas.

### Cultural Landscapes

Cultural landscapes are geographic areas associated with historical events, activities, or persons or that exhibit other cultural or aesthetic values. In Connecticut, most cultural landscapes have been improved by human activity but often incorporate natural landscapes of importance to particular groups of residents. These landscapes sometimes transcend political boundaries and are evocative of Connecticut’s geologic or physical features and forms. They may include rock outcroppings and ridgelines that form north-south geological spines where tool stone was procured for Native American tool kits; lush and ecologically abundant river valleys such as the Housatonic, Thames, and Connecticut River corridors; or the tidal marshlands that support the state’s fishery nurseries and native and migratory bird species. Scenic routes, pastoral landscapes with stone walls associated with Connecticut’s agricultural past, or historic trails or

routes important in the American Revolution such as Rochambeau’s route through Connecticut, are examples of elements contributing to cultural landscapes.

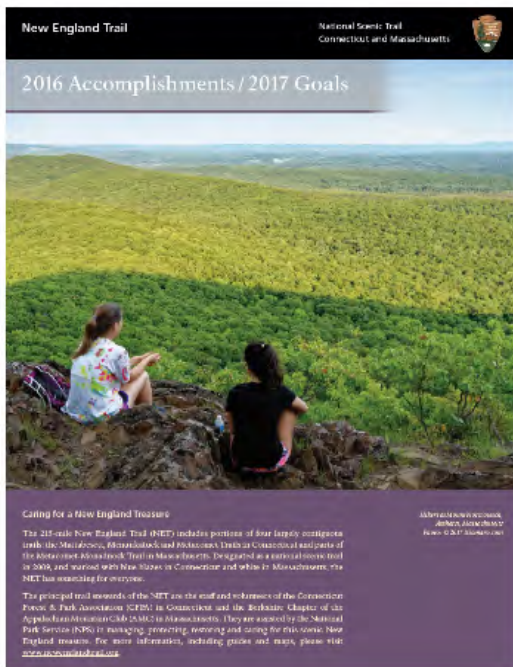


Fig. 4. Cover of 2017 New England National Scenic Trail report (Source: U.S. Department of Interior).

Another example, the New England National Scenic Trail (fig. 4), is a 215-mile trail that includes portions of the Mattabesett, Menunkatuck, and Metacomet Trails in Connecticut and then extends into Massachusetts (U.S. Department of Interior 2017). This route “encompass(es) New England’s iconic large river valleys, long-distance rural and agrarian vistas, as well as colonial historic landmarks, wetlands, vernal pools, and mountain ridgetops” (Connecticut Forest & Parks Association website).

### Ethnographic Resources

Ethnographic resources encompass sites, structures, objects, landscapes, and natural features of longstanding—defined as three generations or more—traditional importance to a contemporary cultural group. In Connecticut, ethnographic resources include Native American sites, town greens, historic shipping and fishing ports, colonial settlement areas, historic routes and transportation corridors, and cemeteries and burial grounds. These places have evolved over time but continue to have lasting cultural importance over generations. In Connecticut,

town greens are a common example of such a resource. In their early days, town greens were unimproved grassy areas used for grazing, public gatherings, religious services, and punishments with public stockades. The New Haven Green, a National Historic Landmark, also was used as a burial ground (fig. 5). Although headstones were relocated to nearby Grove Street Cemetery (also a National Historic Landmark) in the nineteenth century, burials were not. A tree fall as a result of high winds from Superstorm Sandy uncovered skeletal remains tangled in the roots of a 100-plus-year-old tree, demonstrating the evolution of land use over time and the Green’s continued prominence in New Haven’s history (*New Haven Independent* 2012).



Fig. 5. Undated historic view of New Haven Green (Photo: New Haven Public Library, Local History Room and the Treasures of Connecticut Libraries).

Over the years, town greens evolved to become anchors for historic town centers. Usually accompanied by adjacent early places of worship, they have been improved with fences, paved areas, gazebos, bandstands, statues, monuments, and landscaping. Today, greens often serve as community spaces for concerts, craft fairs, holiday festivals, memorial remembrances, and other townwide events.



## Buildings and Structures

Buildings and structures encompass architectural, engineering, and cultural resources constructed to house and to support human activities. The built environment has been a prominent feature of Connecticut's landscape and history since colonization in the 1600s. The state is fortunate to have intact structures that represent Connecticut's colonial roots. These include early towns located along Long Island Sound and in the Connecticut River Valley; and scores of buildings up and down the state's shoreline.

Buildings and structures were a primary focus of the mapping effort completed under the Connecticut SHPO's Hurricane Sandy initiatives. In the analysis of resources by county and city that follows, it should be noted that most of these buildings and structures are either individually designated resources or buildings that have been designated for their collective importance within historic districts.

**Challenges ahead:** The evaluation and appropriate management of resources from the mid-twentieth century and recent past, such as housing dating from the post-World War II era, are preservation planning challenges. Many resources may embody the features of the building types, the period, or methods of construction that characterize this period and may retain the integrity necessary for designation as historic properties. State and local preservation efforts are ongoing to survey and evaluate these classes of resources. The geographic locations of many of these properties, which may be sited in coastal and riverine areas, will influence long-term vulnerability to hazards. Location outside flood zones and surge areas may assume added weight in the future direction of limited preservation resources. Alternative strategies generally not appropriate to historic buildings, such as limited building elevation, hazard hardening, and relocation, may be options considered for such resources.

It is recommended that this mapping data be refined in the future, both to delineate non-contributing properties in historic districts and to review data regularly to ensure accuracy. The data points represent a range of building types under public and private ownership. The mapped data include the state's oldest standing building, the National Historic Landmark Henry Whitfield House (fig. 6), a stone house built in Guilford in 1639. The site is owned and operated by the State of Connecticut as a state museum.

Federal or state undertakings involving funding, permitting, or licensing require consultation with the SHPO on work with the potential to affect historic properties in accordance with federal and state historic preservation laws and regulations. Buildings and structures 50 years or older are assessed for significance and integrity under this process. The number of buildings and structures subject to consultation after a hazard event likely will expand as the age for consideration includes periods from the recent past associated with large volumes of construction in coastal areas.

## **Historic Resources by Coastal County**

This project focused on the four Connecticut counties along Long Island Sound: Fairfield County, New Haven County, Middlesex County, and New London County. *Historic Preservation and Hazard Analysis* reports were prepared for coastal communities in these counties.

### Fairfield County

Fairfield County has 8,258 historic buildings and structures distributed among 23 towns. In addition to Long Island Sound, the Housatonic River, which defines the eastern border of Fairfield County, also poses a future flood hazard risk (fig. 7). Major concentrations of historic buildings are found



Fig. 6. Henry Whitfield House, a National Historic Landmark in Guilford, Connecticut (Photo: Connecticut Department of Energy and Environment Protection).

in Bridgeport (1,807), Stamford (1,179), Norwalk (731), and Westport (713). The coastal communities in Fairfield County that received individual preservation and resiliency planning reports were Greenwich, Stamford, Darien, Westport, Norwalk, Fairfield, Bridgeport, and Stratford.

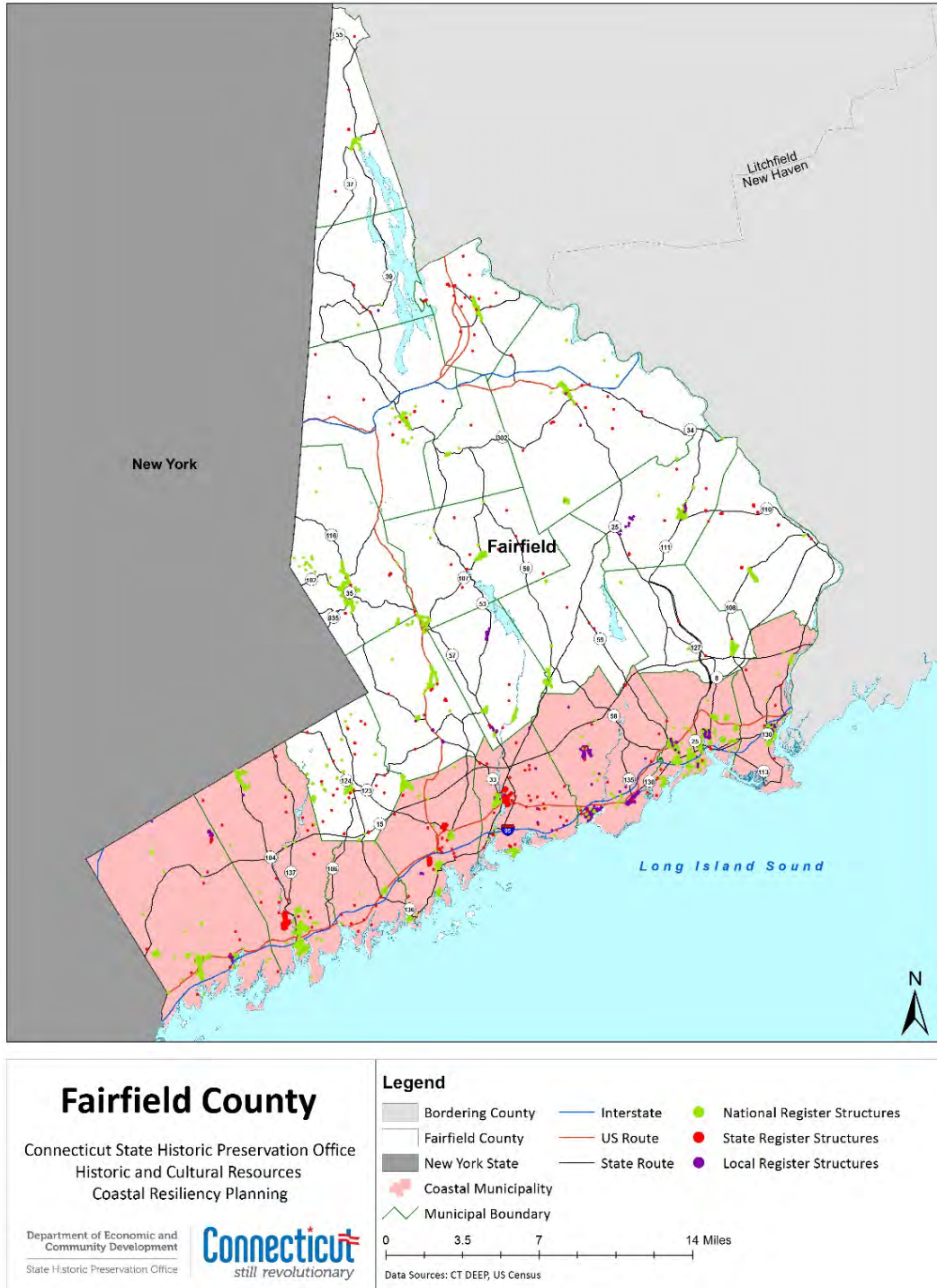


Fig. 7. Fairfield County, Connecticut SHPO, historic and cultural resources resiliency planning.

## New Haven County

New Haven County has 15,603 historic buildings distributed among its 27 towns (fig. 8). New Haven (8,982) contains more than half of all designated properties in the county, followed by Branford (1,771), Waterbury (1,401), and Guilford (1,016). The coastal communities that received individual preservation and resiliency planning reports were Milford, West Haven, New Haven, East Haven, Branford, Guilford, and Madison. The Quinnipiac and Housatonic Rivers also pose primary flood risks in this region.

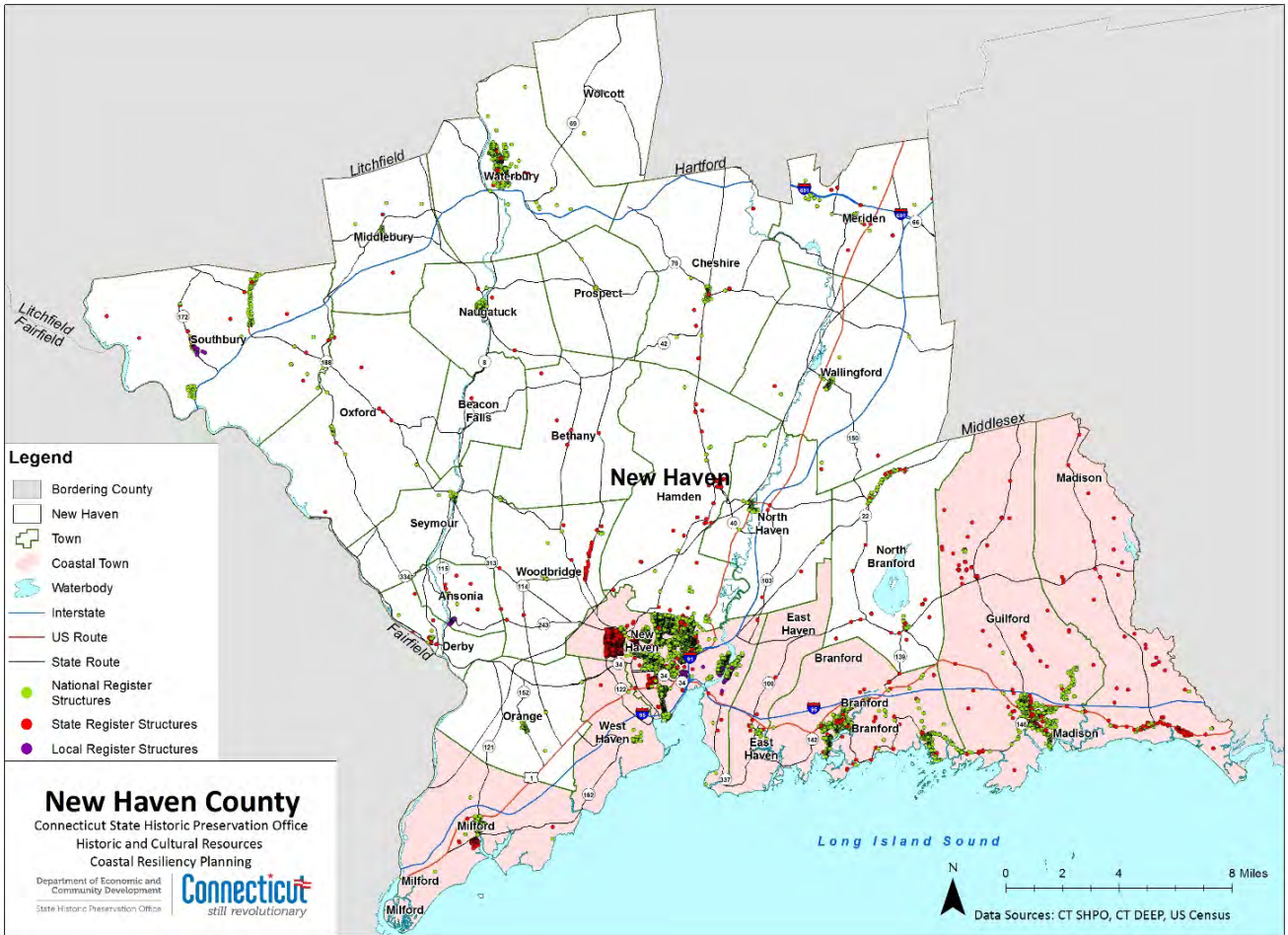


Fig. 8. New Haven County, Connecticut SHPO, historic and cultural resources resiliency planning.



## Middlesex County

Middlesex County has 3,500 historic buildings distributed among its 15 towns (fig. 9). Middletown (602) has the highest number of resources followed by Essex (797), East Hampton (344), and Haddam (322). The coastal communities that received individual preservation and resiliency planning reports were Clinton, Westbrook, and Old Saybrook. A primary feature of Middlesex County is the Connecticut River, which poses additional future flood risks to the area.

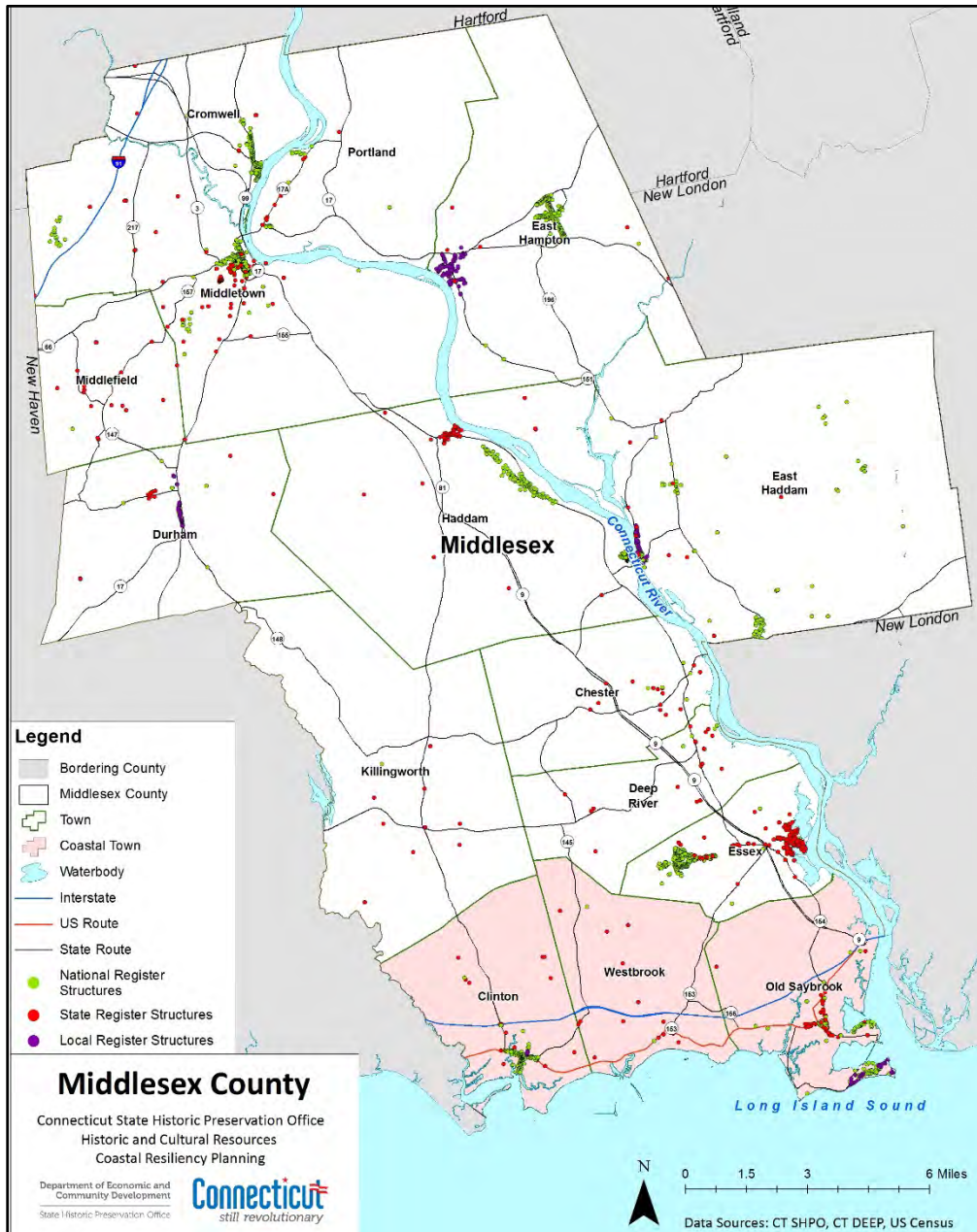


Fig. 9. Middlesex County, Connecticut SHPO, historic and cultural resources resiliency planning.



## New London County

New London County contains 8,861 historic buildings distributed among 21 towns (fig. 10). Norwich has the highest number of resources (2,764), followed by Stonington (1,505), New London (1,475), Groton (1,173), and Waterford (457). The coastal communities that received individual preservation and resiliency planning reports were Old Lyme, East Lyme, Waterford, Groton, and Stonington. The Thames River poses a primary future flood risk to this area.

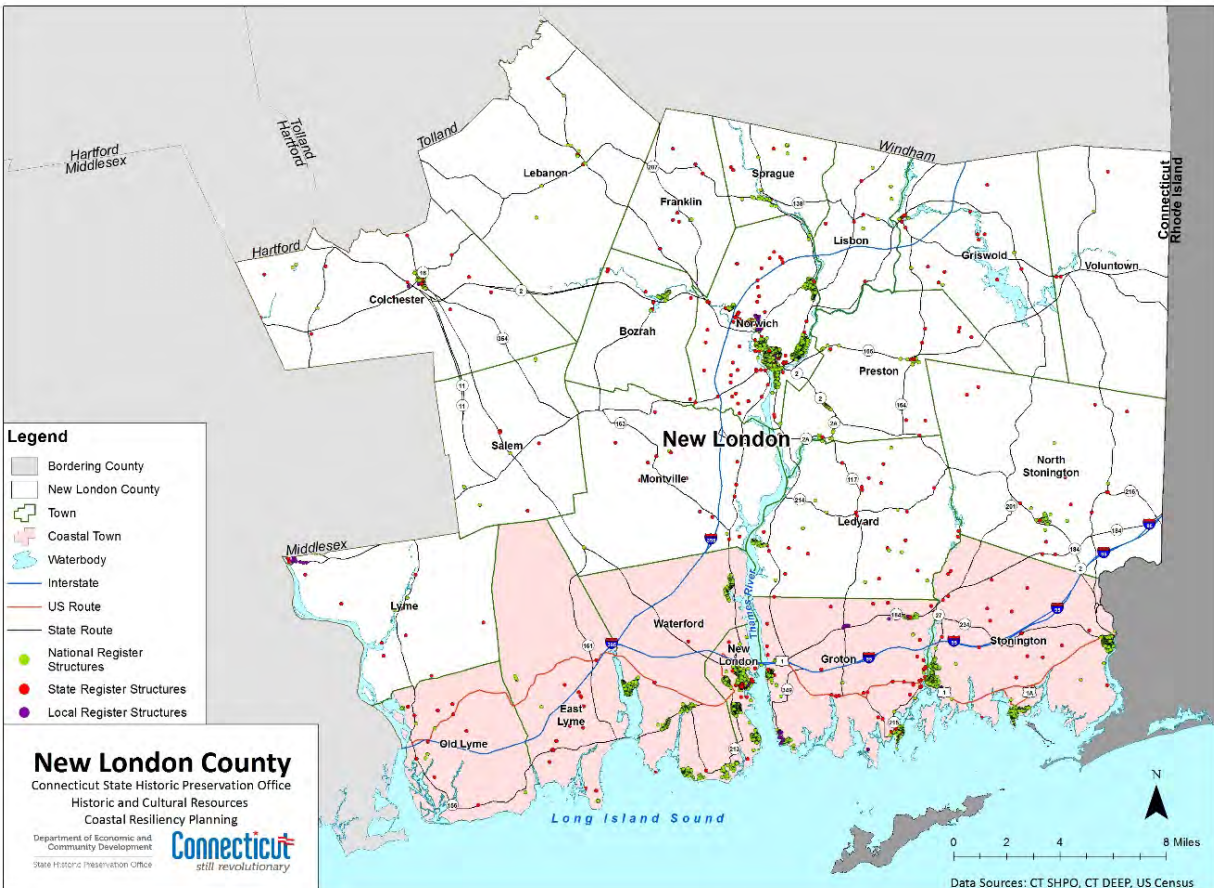


Fig. 10. New London County, Connecticut SHPO, historic and cultural resources resiliency planning.

## Historic Buildings and Structures by Coastal Community

The inventory of historic resources in the 28 coastal communities adjacent to Long Island Sound (including sub-jurisdictions such as the Borough of Fenwick in Old Saybrook) were reviewed and mapped during the first phases of the resiliency planning effort. Table 3 provides a summary of this data by town and total number of resources. The town incorporation dates reference the year in which the municipality was created as a political jurisdiction; historic resources within these communities may predate the official incorporation date. Table 4 provides a projection of the numbers of historic properties within the hazard zone for each county.

**Table 3. Towns and Their Historic Resources**

Town	Incorporation	Historic Resources
Greenwich	1640	626
Stamford	1641	1,179
Darien	1820	42
Norwalk	1649	731
Westport	1693	713
Fairfield	1639	414
Bridgeport	1800	1,807
Stratford	1639	416
Milford	1639	350
West Haven	1921	37
New Haven	1638	8,982
East Haven	1707	49
Branford	1644	1,771
Guilford	1639	1,016
Madison	1826	190
Clinton	1838	240
Westbrook	1810	26
Old Saybrook/Fenwick	1854	313
Old Lyme	1855	130
East Lyme	1816	84
New London	1646	1,475
Waterford	1801	457
Groton, City	1705	*
Groton, Town	1903	1,173
Stonington Town and Borough	1649	1,505

\*Included with Town of Groton calculation

**Table 4. Historic Buildings and Structures by County**

County	Total Recorded Historic Buildings and Structures	Number of Recorded Historic Buildings and Structures within Hazard Zone	Percentage of Recorded Historic Buildings and Structures within Hazard Zone
Fairfield	8,258	1,892	22.9%
New Haven	15,603	853	5.5%
Middlesex	3,500	158	4.5%
New London	8,861	1,304	14.7%

### Historic Resource Data Gaps

Inventories of designated historic properties are “snapshots in time.” They are not comprehensive lists of significant historical and cultural properties. Identification and designation of resources that meet the criteria for local, state, or federal recognition are ongoing.

The limits of cultural resource survey data for existing resources in risk zones present a challenge for preservation planners, and additional survey work should be a priority. Buildings and neighborhoods that have not been surveyed, and significant archaeological resources as yet undiscovered, have the potential to increase our understanding of our shared past and may present opportunities for public interpretation, community cohesion and interaction, and economic development. Heritage is a demonstrated asset in the post-disaster recovery of communities. As our physical environment changes and evolves, the lack of survey and inventory data may preclude adequate preservation planning.

Survey and registration priorities developed in consultation between SHPO and local jurisdictions may assist in identifying and addressing local data gaps efficiently. Such consultation might consider:

- Suburban neighborhoods associated with post-World War II era
- Directed survey of postmodern residential building types
- Postwar industrial and commercial buildings and structures
- Postwar buildings and structures associated with important personages in Connecticut's recent past
- Postmodern buildings designed by master architects
- Archaeological investigations in undisturbed but vulnerable areas.

Adoption of such priorities also would assist local property owners and municipalities with expanded baseline data to support mitigation or reconstruction decisions in post-disaster environments.

## CHAPTER IV

# NATURAL AND ANTHROPOGENIC HAZARDS AFFECTING HISTORIC RESOURCES

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Historic resources in local communities are subject to the same hazards that affect all towns and cities in Connecticut. Historic resources are vulnerable to a variety of forces and hazards, from economic development pressures to fires to earthquakes. This initiative focused on hazards associated with coastal storms, such as Superstorm Sandy, Tropical Storm Irene, or nor'easters, as well as the hazards associated with climate change.

Specific hazards associated with coastal storms are:

- **inundation and erosion** from storm surge and riverine flooding
- **stress** from high winds
- **debris** from high winds
- **snow** load from winter storms
- **icing** from winter storms

In addition, climate change is anticipated to contribute to the progressive and increased severity of hazards associated with coastal storms, as well as rising sea levels that will increase the elevation of storm surge and associated inundation. The following discussion highlights the major hazards to cultural resources and the assumptions considered in this study.

### **Flooding**

Significant coastal flooding is associated with severe storms such as hurricanes, tropical storms, and nor'easters. Astronomical high tides also can result in shallow flooding. Erosion and the accompanying changes to shorelines are recognized coastal hazards. Sea level rise recently was added to the threats considered in planning for resilience.

Flooding is the most likely hazard in Connecticut, as it is in many areas of the United States; it has the potential to affect all communities in the state. The high risk of flooding in the United States led the majority of private insurance companies to leave the flood insurance market in the 1960s. Congress created the National Flood Insurance Program (NFIP) in 1968 to support real estate markets and to increase lender confidence for properties in flood-prone areas. The NFIP provides insurance specifically for properties with flood risk, and it defines flood-risk areas through its development of flood maps. Active community membership in NFIP is required for property owners to qualify for insurance coverage. Member communities commit to adopting development regulations to limit flood damage in new development and for existing buildings undergoing improvement. Connecticut municipalities began to join the NFIP in the late 1970s or early 1980s.

Under the NFIP, Special Flood Hazard Areas (SFHAs) were identified with the potential for “100-year floods,” which are defined by the amount of rainfall within 12- to 24-hour periods. A 100-year flood has a 1 percent chance of occurring annually. Flood insurance is mandated for properties within a SFHA if a financial instrument, such as a property mortgage or home equity loan, has been issued by a federally regulated lender. The potential for the 100-year flood volume within an SFHA to be reached or exceeded in a year historically has been estimated at 1 percent. However, flooding associated with storm events has exceeded this estimate on a regular basis in many parts of the country.

The SFHA boundaries and elevations are used in individual municipal studies to identify hazard areas; they were adopted in the current hazard analysis. Future risk areas also were anticipated through the 2080s applying sea-level-rise projections under a “medium” sea-level-rise rate scenario.

## Wind

Vulnerability to wind hazards was assumed to be approximately equal across the four-county area. Properties directly on the shoreline typically are anticipated to sustain greater wind damage owing to the absence of natural and/or built barriers to slow winds blowing in from the water. Certain types of construction have greater vulnerability to wind stress; that factor was considered in the analysis of hazards to historic resources.

## Winter Storms

Winter storm hazards were assumed to be an approximately equal threat across the planning area. The higher vulnerability noted for wind hazards directly on the waterfront generally does not apply in winter storms. Snowfall was anticipated as an equal threat in coastal areas owing to its consistent low elevation, which reduces the potential for high-volume storms associated with higher elevations. Certain types of construction and types of building designs are more vulnerable to winter storm hazards than others, as is so with wind hazards. The greatest risk to older buildings presented by winter storms was related to excessive snow loads on roofs. Factors contributing to the risk include building design and structural integrity.

## **Risks Related to Climate Change**

Climate scientists project that climate change will mean storms of greater frequency and severity. In addition to the hazards posed by storm events, the effects of climatic change on the environment and weather patterns can be expected to introduce additional stresses on historic resources. Historic resources such as buildings and structures are systems with established patterns and tolerances of responses—expansion and contraction, for example—over annual cycles. Best preservation practices address the appropriate treatment of deteriorated building fabric and seek to correct conditions that contributed to material deterioration. Changes in climatic affecting historic resources, including increased precipitation, temperature change, and sea level rise, are anticipated to exacerbate the conditions leading to material deterioration. Ultraviolet light also is a destructive agent to organic materials. Temperature affects the thermal expansion of materials and can stress building systems. Water penetration is a major factor contributing to the deterioration of historic building fabric. Sea level rise presents not only the potential for flooding but also for the introduction of salts to building materials, resulting in staining and encrustation of building surfaces.

The discussion and tables below anticipate climate-change-related risks and impacts to Connecticut’s cultural resources; they were based on the NPS analysis in *Cultural Resource Climate Change Strategy*, published in December 2016 (U.S. Department of the Interior 2016). Tables similar to

those found in that document were developed to summarize potential threats from temperature change, precipitation change, and sea level rise. This study extracted observed phenomena most relevant to Connecticut. Impacts to the different categories of historic resources in Connecticut that may result from specific environmental changes then were identified.

## Temperature Change

In their newsletter *Your Environmental Connection—February 2017*, the Connecticut Department of Energy and Environmental Protection (DEEP) reported that 16 of the 17 hottest years recorded had occurred since 2000 (Connecticut DEEP 2017). Higher temperatures dramatically affect water temperatures, fisheries, crop yields, species migrations, and the movement of invasive species. Table 5 illustrates the impacts of temperature change on the classes of historic resources. As global temperatures rise, a number of observable phenomena can be anticipated in Connecticut. The impacts of each of these phenomena on different types of historic and cultural resources are summarized in the table below.

**Table 5. Temperature Change and Related Impacts**

Observed Phenomena	Notes	Impacts on Cultural Resources			
		Archaeological Resources	Cultural Landscapes	Ethnographic Resources	Buildings and Structures
Increased Average Temperatures	Higher average and maximum temperatures are expected in Connecticut	Drought/dry land/ leading to shifting soil and site damage.	Stress or resulting degradation of landscape vegetative.  Introduction of non-traditional species and plant materials.  Loss of habitat for traditional species.  Stress to constructed landscape elements such a wood foot bridges, gazebos, etc.	Higher water temperatures lead to changes to traditional food sources— i.e., lack of lobsters, shellfish areas, flounder, or shad in Long Island Sound— that previously defined a way of life in certain areas of Connecticut.  Threat and change to native tree and plant species.	Greater demand for air-conditioning equipment that may alter the historic characteristics of the building.  Building material stress.  Quicker fading and wear of paint and exterior finishes.  Climatic conditions conducive to wood-damaging insect migration.  Structural stress due to changing patterns of thermal movement.

Observed Phenomena	Notes	Impacts on Cultural Resources			
		Archaeological Resources	Cultural Landscapes	Ethnographic Resources	Buildings and Structures
Higher Relative Humidity	Warmer air holds more moisture	More rapid decay and deterioration of exposed sites.	Decline/disappearance of native plant and animal species.  Increase/spread of non-native plant and animal species.	Decline/disappearance of native plant and animal species.  Increase/spread of non-native plant and animal species.	Increased decay and damage to buildings from insects and marine borers and botanical, biological, and microbiological invasion.  Accelerated corrosion of metals.  Warping of material.
More intense coastal storms	Warmer Atlantic water and air will lead to more powerful storms occurring more frequently	Site erosion. Site inundation. Damage from debris and debris storage activities.	Potential loss of significant trees and vegetation. Erosion. Damage and/or loss of character-defining elements.	Potential dangerous conditions and limited access at higher elevation ridge line areas.	Inundation. Damage and/or loss.  Potential cladding and roof damage.  Damage from wind-borne debris.
Increased Wildfire	Higher temperature → droughts, fire risk	Physical damage from ground disturbance related to fire-fighting efforts.  Increased potential for erosion (post-fire)	Loss or damage to associated structures.  Loss or damage to trees and vegetation.	Loss or damage to landscape features, such as trees and vegetation.  Damage to potential support structures.	Loss or damage to buildings and structures.
Changes in Seasons/ Phenology	The timing and length of seasons will shift with temperature changes	Limited impacts	Shift in ability to grow traditional Connecticut crops due to reduction in dormancy period, shorter or longer growing seasons.  Changes in hardiness zones anticipated to impact composition of “native species”	Reduction or loss of fall leaf colors.  Loss of orchards and maple syrup production.	Longer growing seasons may lead to more invasive wood-boring insects moving into Connecticut that could damage historic structures.  Structural stress due to changing patterns of thermal movement.
Species Shift		Limited impacts	Insect and animal territory shifts may negatively affect native Connecticut plant and animal species.	May negatively affect native plant and animal species.	New threats to wood structures if warmer weather insects move north and have a longer non-dormant period with warmer temperatures.



Observed Phenomena	Notes	Impacts on Cultural Resources			
		Archaeological Resources	Cultural Landscapes	Ethnographic Resources	Buildings and Structures
Invasive Species/ Pests		Limited impacts	Change in traditional plant and vegetation evocative of sense of place – i.e., loss of elms in the “Elm City.”	May negatively affect native plant and animal species.	New threats to wood structures if warmer weather insects move north and have a longer non-dormant period with warmer temperatures.
Pollution	Increased heat = decreased air quality	Limited subterranean impacts for unexcavated sites.  Higher ambient acidity may damage exposed artifacts and sites.	Loss of plant and animal species.  Loss of view corridors due to increased air pollution effects.	Stone blackening in cemeteries and on other statues and monuments.	Stone blackening.  Erosion or damage to exterior materials due to more acidic rain and other pollutants.

### Precipitation Change

Climate change is associated with extreme weather events that have contributed to intense periods of droughts followed by periods of potentially intense rainfall events (Table 6). Precipitation generally has increased in volume and intensity in the New England region (EPA 2016). This section includes impacts related to an increase in flooding and extreme weather events.

**Table 6. Precipitation Change and Related Impacts**

Observed Phenomena	Impacts on Cultural Resources			
	Archaeological Resources	Cultural Landscapes	Ethnographic Resources	Buildings and Structures
Less Precipitation Increased Drought (Longer dry periods expected)	Drier soils may shift causing damage to existing resources.  Dry soils may erode with heavy rainfall events following drought periods.	Tree and vegetation loss due to dry conditions.	Tree and vegetation loss due to dry conditions.  Potential drying and cracking of wooden structure elements like footbridges, piers, decks, and docks.	Potential drying and cracking of wooden structure elements and architectural cladding.  Structural stress due to changing patterns of thermal movement related to changes in relative humidity.

Observed Phenomena	Impacts on Cultural Resources			
	Archaeological Resources	Cultural Landscapes	Ethnographic Resources	Buildings and Structures
More/ More Intense Precipitation (Larger large precipitation events expected)	<p>Potential site erosion following dry periods with heavy rainfall.</p> <p>Channeling potential to low-lying excavated sites.</p> <p>Damage from snow removal and storage activities.</p>	<p>Higher likelihood for tree fall due to saturated conditions.</p> <p>Vegetation loss due to High-volume runoff.</p> <p>Decreased soil fertility.</p> <p>Bank and coastal erosion.</p>	<p>Damage to structures.</p> <p>Potential inundation and loss of access and vegetation.</p> <p>Increased flooding.</p> <p>More pollution/debris in watershed areas.</p>	<p>Swelling and damage to wooden structures.</p> <p>Potential erosion and scour to foundations.</p> <p>Increased rate of water infiltration into building from ground and surface water.</p> <p>Increased areas of flooding due to inadequate storm water drainage capacity.</p> <p>Damage from snow load/ roof collapse.</p>
Increased Flooding Events	<p>Increased flooding potential to low-lying excavated sites.</p>	<p>Road and/or trail washouts.</p> <p>Potential inundation and loss of access and vegetation.</p> <p>Damage to potential supporting structures and interpretive signage.</p>	<p>Damage to structures.</p> <p>Potential inundation and loss of access and vegetation.</p>	<p>Damage to structure and surrounding land area.</p> <p>Potential inundation and loss of access and vegetation.</p>
Extreme Weather Events	<p>Erosion of coastal and riverine sites.</p>	<p>Erosion of coastal and riverine sites.</p> <p>Greater risk of lightning strike/wildfire events.</p> <p>Tree loss for high wind events.</p>	<p>Limited access due to extreme storm events.</p> <p>Potential damage to auxiliary structures.</p> <p>Tree loss for high wind events.</p>	<p>Damage to structures from high winds, tree fall, and wind-borne debris.</p> <p>Erosion to coastal and riverine sites.</p>

## Sea Level Rise

The Connecticut Institute for Resiliency and Climate Adaptation (CIRCA) provides updated analyses of localized sea level rise impacts through its website: <http://circa.uconn.edu/sea-level-rise/>. As noted, “The rates of sea level rise in Connecticut can be measured directly from tide gauges in New London and Bridgeport. The rates of these local gauges are higher than the global average based on tide gauge data of 3.2 mm/year since records started to be collected in 1900. One established source of this more rapid rate of rise is subsidence” (CIRCA website). The graphic below was developed by the Intergovernmental Panel on Climate Change (IPCC/2001); it is reproduced on the CIRCA website (fig. 11). It illustrates some of the causes of sea level rise.

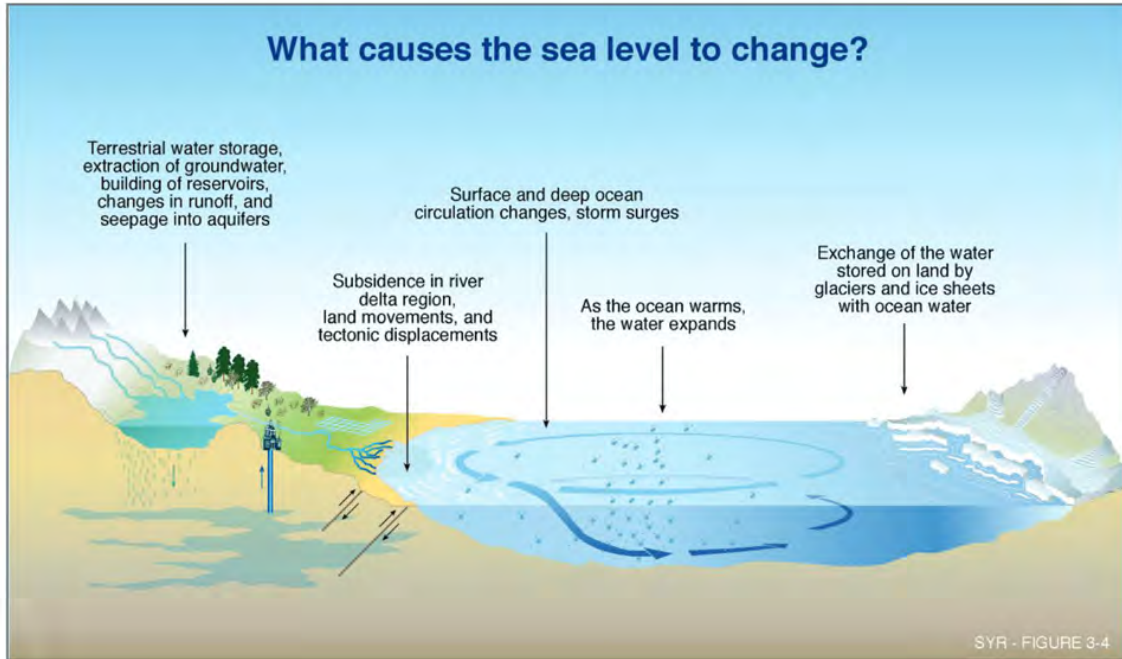


Fig. 11. Sea level rise (Source: CIRCA website from IPCC/2001).

Connecticut Public Act 13-179 (2013) requires that the state and localities use the National Oceanic and Atmospheric Administration (NOAA) Technical Report OAR CPO-1 on sea-level-rise scenarios in land use analysis for the development of individual Plans of Conservation and Development (POCDs). Towns also use the NOAA sea-level-rise scenarios in their Municipal Evacuation Plans and Hazard Mitigation Plans. The expected increase in flooding, coastal erosion, storm surge, and higher water-table levels all have the potential to impact to historic resources as reflected in Table 7.

**Table 7. Sea Level Rise and Related Impacts**

Impacts on Cultural Resources				
	Archaeological Resources	Cultural Landscapes	Ethnographic Resources	Buildings and Structures
Inundation/ Frequent Flooding	Partial or full submersion of settlement sites.  Erosion.  Loss of access.	Partial or full submersion of resource areas.  Vegetation loss/change.  Loss of access.	Loss or limited access to traditional public spaces and cultural important spaces.  Loss of access.	Structural damage or collapse.  Utility and systems damage.  Loss of access.
Storm Surge	Destruction and erosion.  Accidental removal during cleanup and recovery – including construction of hardscape and softscape mitigation features.	Alteration of historic coastal landscape areas, historic beaches, and tidal marshland areas.	Potential damage to structures in historic coastal areas such as docks, boardwalks, and piers as well as in tidally influenced historic riverine locations.	Structural damage or collapse.  Utility and systems damage.  Loss of original historic architectural materials.

Impacts on Cultural Resources				
	Archaeological Resources	Cultural Landscapes	Ethnographic Resources	Buildings and Structures
Coastal Erosion	Exposure and degradation of previously undisturbed sites/remains.	Alteration of historic coastal landscape areas, historic beaches, and tidal marshland areas.	Potential erosion of foundation supports for docks, boardwalks, and piers.	Loss of land area surrounding structures.  Structural damage or collapse.
Higher Water Table	Added water to unexcavated site may result in site degradation.	Vegetation loss/change due to saturated soil conditions/change in salinity.	More frequent “sunny day” flooding events, limiting access to lower-lying historic resources along coastal and riverbank areas.  Potential inundation.	Potential saltwater intrusion causing loss of supporting well and septic systems.  Materials degradation related to salt migration and freeze-thaw cycles.  Higher risk for basement flooding due to saturated ground conditions.  Increased groundwater infiltration.
Salt Water Intrusion	Sites compromised due to change in soil salinity.	Decline/disappearance of vegetation species such as infiltration of salt marsh into former upland meadow areas.	Loss of well water and septic system viability for supporting structures.  Migration or loss of traditional vegetation.	Loss of well water and septic system viability.  Materials degradation related to salt migration and freeze-thaw cycles.  Increased rust and corrosion risk to structures and onsite systems.
Development Migration	Excavation may cause irreparable damage to undocumented sites—particularly with large machine work.  Loss of coastal real estate will push development inland, exposing new areas to risk	Disruption of views and vista due to development intrusion into distinctive natural corridors and view sheds.  Impacts of alternative energy production (wind turbines, solar panels).	Habitat fragmentation.  Diminished value of resources owing to incongruent scale of new development.	Potential conflict with context for historic sites with new development.  Threat of demolition to existing resources with gentrification and new development on adjacent non-contributing development sites.  Loss of resource through abandonment.

A large number of historic properties along the Atlantic Coast from North Carolina to Massachusetts are threatened by sea level rise. In Connecticut, 131, or 8.59 percent, of the total 1,525 properties listed in the National Register of Historic Places in 2016 will be endangered by the six-foot sea level rise projected in 2015 by the National Oceanic and Atmospheric Administration by the turn of the century (fig. 12). This is illustrated by the example of Westport, where a six-foot rise would inundate hundreds of historic properties (fig. 13).

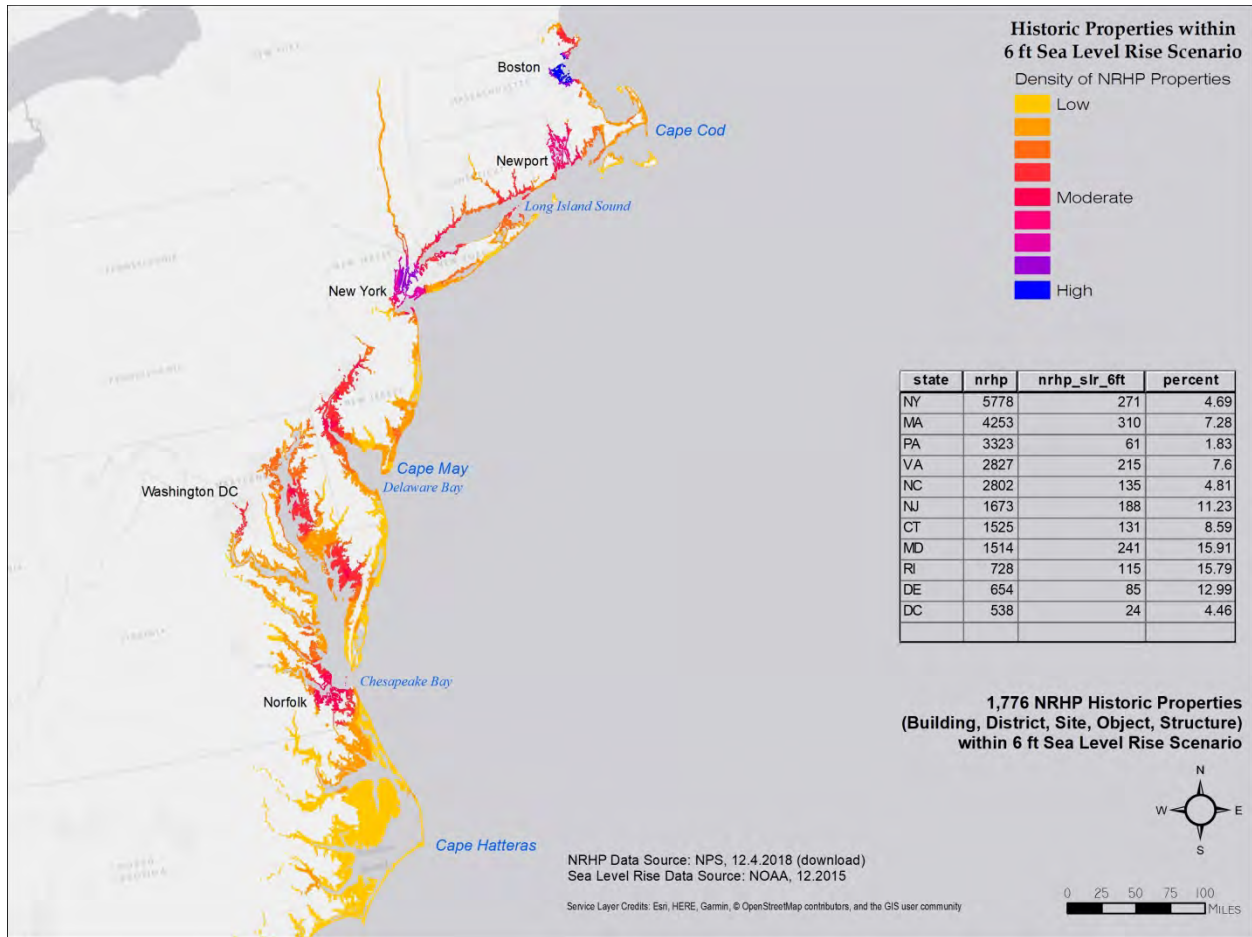


Fig. 12. Historic properties within six-foot sea level rise.

Although it is impossible to predict with certainty specific effects from storm events, environmental change, and rising sea levels to individual historic resources, our knowledge of the character and vulnerabilities of historic properties and of the nature of the potential threats makes it possible to project the range of damage likely to be encountered. The analysis of threats to historic resources and the potential damages should be revisited as our knowledge about climate change increases.



Fig. 13. Predicted extent of flooding in Westport, showing historic properties and town areas likely to be inundated by 3- and 6-foot sea-level rise. Data from NOAA, map by Dewberry and RCG&A.



## CHAPTER V

# RESILIENCY PLANNING: ASSESSMENT AND RECOMMENDATIONS

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With few exceptions, natural hazard resiliency plans do not address historic resources adequately. The rare planning studies that include historic resources generally emphasize institution-specific responses, such as emergency plans for museum collections, or reactive, and often post-disaster, compliance with state and federal historic preservation legislation. Superstorm Sandy, which damaged historic properties in many parts of the Northeast, underscored the need to incorporate historic resources into resiliency planning. This chapter analyzes major federal, state, and local planning efforts and includes recommendations for the consideration of historic resources.

### **National Flood Insurance Program Requirements and Historic Properties**

All Connecticut communities voluntarily participate in the National Flood Insurance Program (NFIP). Such participation requires that a community adopt regulations for the review of developments in their floodplains, implement design standards for new and substantially damaged or improved structures within the Special Flood Hazard Area (SFHA), enforce those standards through the force of law, and maintain required elevation data in conjunction with proposed and completed development projects. Community regulations or ordinances must meet or exceed minimum standards established by the Federal Emergency Management Agency (FEMA) as established in Title 44 of the Code of Federal Regulations (CFR), Section 60.3 (44 CFR 60.3)

In exchange, property owners in participating communities and outside designated Coastal Barrier Resource System areas may purchase flood insurance through the NFIP. Currently, property owners are assured access to flood insurance regardless of previous damage claims, provided the community maintains active participation in the program. Federal law also requires that all properties with lending in place through federally regulated institutions via instruments such as mortgages or equity lines of credit maintain flood insurance for the full term of the loan. In addition, most federal loans or grants to properties in the SFHA require flood insurance. The inventory of properties insured through the NFIP includes many historic resources.

The NFIP does not include rating exemptions for historic properties. The cost of flood insurance is evaluated based on the elevation of the first finished floor relative to the base flood elevation (BFE). An increased likelihood of damage to the finished floor relative to the BFE translates to higher premiums. Elevating buildings and structures have the potential to affect the integrity of historic properties on individual and collective levels. The scale of a property may be changed as well as the resource's relationship to its setting. The overall architectural character of a surrounding historic district may be altered. The level to which a property may be elevated without loss of integrity generally is assessed on a

case-by-case basis, dependent on the resource design and setting. The incentive to lower flood insurance costs in vulnerable areas often serves as a disincentive to historic preservation for private property owners.

Local flood hazard regulations generally require review of proposed construction plans for buildings in floodplains to determine whether the cost of the proposed work (damage repair or improvement) exceeds 50 percent of the present value of the structure. Work that exceeds 50 percent of the present building value necessitates that the building be made flood-compliant—floodproofing for commercial buildings and elevation above the BFE for residential buildings—before permits are issued for new work. A designated historic structure may be exempted from the substantial damage and substantial improvement requirements, either through local regulation or through variance from local Zoning Board of Appeals. However, flood-compliance waivers have consequences:

- Natural hazard vulnerability for unreinforced or unelevated buildings is not improved and may increase over time with sea level rise or other risks.
- Non-elevated historic structures in high velocity flood zones may be subject to significant wave-action damage, including irreparable loss of original materials.
- Flood insurance costs will be high.

Privately owned historic residential properties that are not required to maintain flood insurance pursuant to federal lending and oversight requirements may be candidates for alternative adaptation strategies, such as dry or wet floodproofing, when local variances are granted. Owners exercising these options still face hazard risks and the challenge of affordable flood insurance. Local disaster preparedness planning through local historic districts and preservation advocacy groups may offer opportunities to address this complex issue on a local level for selected landmarks in the community.

## **State Planning Instruments: Gap Analysis**

States provide a framework for local policymakers and planners. State plans also may direct specific actions supported by dedicated resources. Historic resources currently are not addressed in state planning documents aside from the NPS-mandated Connecticut State Historic Preservation Plan. Opportunities exist to integrate historic preservation concerns in the state resiliency planning effort, in particular through the State Hazard Mitigation Plan, scheduled for update by February 2019, and the pending 2018-23 *Connecticut Conservation and Development Policies Plan* (Connecticut Office of Policy and Management [OPM] 2013). The state also has developed a *Connecticut Climate Preparedness Plan*, but this document does not include an analysis of impacts to historic resources. Likewise, historic resources are not addressed in the state's *Emergency Operations Plan* (OPM/University of Connecticut 2016). Inclusion of planning for historic properties in updates to these documents is strongly recommended.

## **State Hazard Mitigation Plan**

State Hazard Mitigation Plans (HMPs) must be updated every five years. Updates must be completed in accordance with Sections 201.4 and 201.4(d) of the Disaster Mitigation Act of 2000. The HMP identifies risks and vulnerabilities associated with natural disasters and presents strategies to protect people and property from hazards over a five-year planning horizon. A FEMA-approved state HMP is required for the receipt of certain types of disaster assistance, including funding for mitigation projects, which may include historic properties. Such mitigation projects may include building elevation and relocation. Formal adoption of the HMP makes Connecticut eligible to receive federal assistance equal to



15 percent of the total amount of damage in a presidentially declared disaster under the FEMA Hazard Mitigation Grant Program (HMGP).

### *Analysis*

The Connecticut HMP does not address historic resources, nor does it include a Historic Resource Annex. This annex should be added to HMP updates. The next update, scheduled for completion in early 2019, is under way. The update is being led by the Department of Emergency Services and Public Protection (DESPP). DESPP is aware of the historic and cultural resources resilience efforts of the SHPO and has committed to considering historic resources in the plan update. A representative of the SHPO also is participating as a member of the planning committee.

In addition to the plan update, it should be noted that all Hazard Mitigation Assistance (HMA) grant applications address historic properties in a reactive manner through Appendix C, which requires archaeological and historic resources review:

#### *Archaeological and Historic Resources*

*a) Is the project site located in any area of archaeological, cultural, or historical significance? Contact the State Historic Preservation Officer (SHPO) for determination.*

### State Plan of Conservation and Development

State statute Sections 16a-25 through 16a-30 directs the State of Connecticut to prepare, adopt, and update a Plan of Conservation and Development (POCD) every five years. The plan presents broad public policy guidance across a range of planning areas. The currently proposed POCD establishes a set of conservation and development policies for the state for adoption by the State's Continuing Legislature Committee on Planning and Development. The recently proposed draft provides general policy statements and references to other planning documents such as the State's Historic Preservation Plan and HMP.

### *Analysis*

The Draft Plan for 2018–23, page 17, includes the following state agency policies with potential historic preservation impact:

- **Preserve and Protect**: “Connecticut Heritage Areas, archaeological areas of regional and statewide significance, and natural areas, including habitats of endangered, threatened and special concern species, other critical wildlife habitats, river and stream corridors, aquifers, ridgelines, large forest areas, highland areas, and Long Island Sound.”
- **Revitalize**: “rural villages and main streets by promoting the rehabilitation and appropriate reuse of historic facilities, such as former mills, to allow a concentration of higher density or multiple use development where practical and consistent with historic character.”
- **Minimize**: “the potential risks and impacts from natural hazards, such as flooding, high winds and wildfires, when siting infrastructure and developing property. Consider potential impacts of climate change on existing and future development.”

Beyond the risk policy statement, the Connecticut POCD is limited in discussion of hazards. However, the map below illustrates the locations of historic districts in relation to the 100-year floodplain (fig. 13).

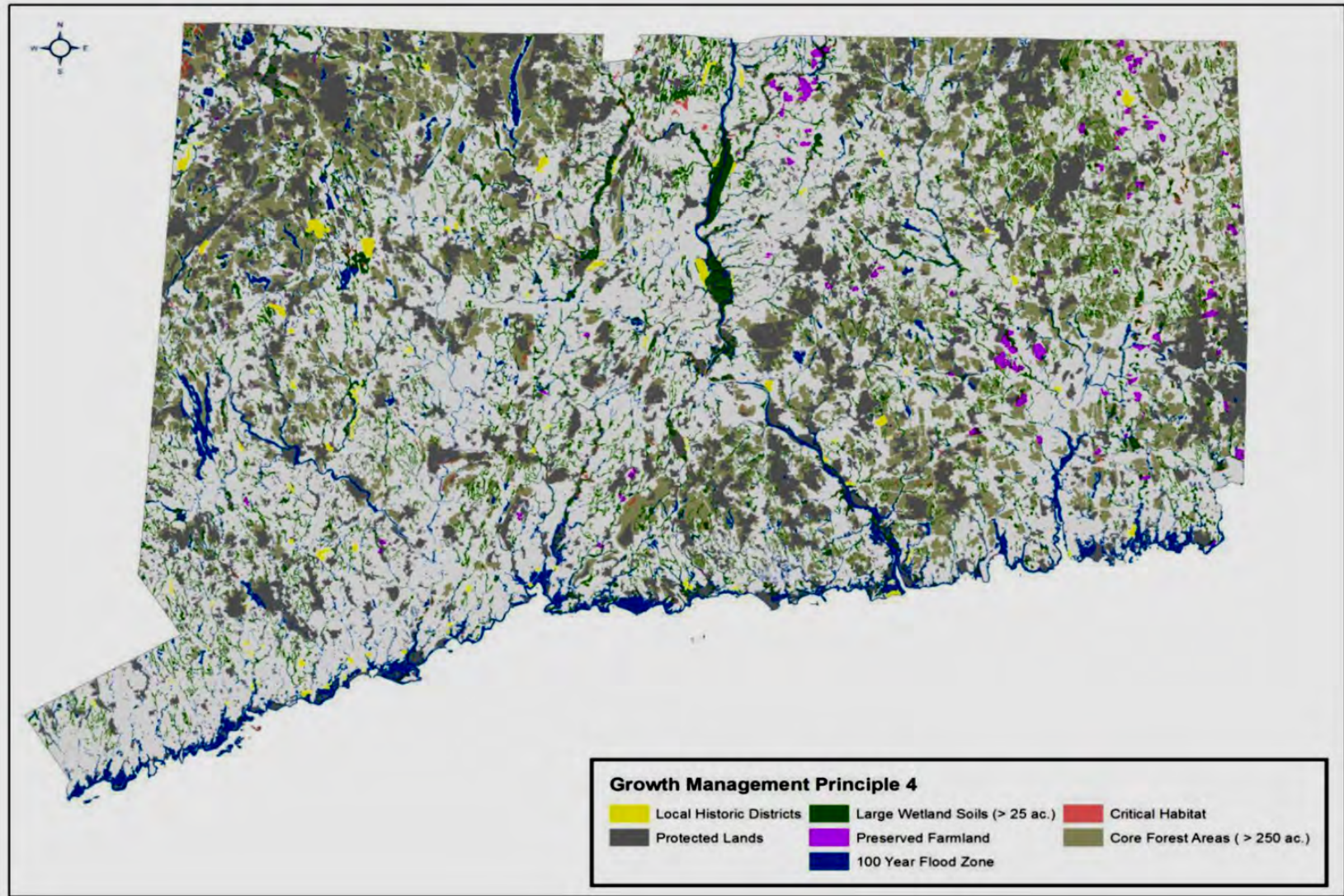


Fig. 14. Map showing local historic districts in relation to the 100-year floodplain (Connecticut POCD Draft: 20).

The POCD also identifies several programs for historic preservation incentives and grant funding:

- Federal Historic Preservation Tax Incentive (DECD);
- Historic Homes/Structures Rehabilitation Tax Credit program (DECD);
- Historic Preservation Survey and Planning Grants program (DECD);
- Historic Preservation Tax Credit (DECD); and
- Historic Restoration Fund program (DECD).

The Connecticut POCD highlights Connecticut Heritage Areas, defined as “a place within the state that has been identified by the General Assembly as having significant historic, recreational, cultural, natural and scenic resources that form an important part of the state’s heritage” and heritage corridors.

### Connecticut Climate Preparedness Plan

As directed by Public Act No. 08-98—*An Act Concerning Connecticut Global Warming Solutions*, the Adaptation Subcommittee of the Governor’s Steering Committee on Climate Change issued a draft Connecticut Climate Preparedness Plan in early 2011. The subcommittee at the time included federal, state, and local officials, academics, nongovernmental organizations, and legislators who were charged to “evaluate the projected impacts of climate change on Connecticut agriculture, infrastructure, natural resources and public health,” and to develop strategies to lessen those impacts. It is likely that revisions to the 2011 document will be undertaken by the Connecticut Institute for Resiliency and Climate Adaptation (CIRCA) at the University of Connecticut, which was created in 2013.

### *Analysis*

The strategies outlined in the 2011 Climate Preparedness Plan supported five objectives:

- Intensify efforts to ensure preparedness planning;
- Integrate climate change adaptation into existing plans;
- Update existing standards to accommodate change expected during infrastructure design life;
- Plan for flexibility and monitor change; and,
- Protect natural areas and landscape features that buffer potential impacts from climate change.

Building on the Climate Preparedness Plan, the work of Governor Dannel Malloy’s “Two Storm Panel,” and the outreach and analysis undertaken by the General Assembly’s Climate Change & Shoreline Preservation Taskforce, DEEP is carrying out a number of actions to accomplish resiliency and adaptation goals. These goals are:

- Development of a state Natural Hazards Mitigation Plan in cooperation with the Division of Emergency Management and Homeland Security (DEMHAS) of the Department of Emergency Services and Public Protection (DESPP);
- Incorporation of the considerations of climate change and sea level rise into the recently adopted 2013 - 2018 Plan of Conservation and Development as the Office of Policy Management and State agencies implement the new Plan;
- Partnership with UCONN to establish a Center for Climate Resiliency at Avery Point to serve coastal communities and promote multi-disciplinary collaboration of energy and engineering programs at UCONN that will support resiliency efforts statewide;
- Development of an action plan for ensuring a resilient energy infrastructure (e.g., microgrids and hardening of poles, wires, and substations);
- Collaboration with municipalities in adapting publicly owned sewage treatment facilities to reduce potential for system failures;
- Assistance to the Department of Transportation as they implement a pilot program to resize culverts to accommodate increases in storm flows;
- Support to Storm Sandy recovery efforts to ensure that rebuilding along the coastline is done in a sustainable manner;
- Collaboration with the Department of Insurance and the insurance industry to reduce loss of life and property;
- Incorporation of adaptation planning into the prioritization of state and local open space protections and ensure that consideration of ecosystem services is included in the revision to the state’s Green Plan;
- Inclusion of adaptation strategies in the statewide Wildlife Management and Forestry action plans as these plans are revised; and
- Support and technical assistance to municipalities interested in developing local adaptation plans (DEEP website 2018).

### Connecticut State Response Framework

The Connecticut State Response Framework (SRF) last was updated in accordance with Section 28-5(b) of the Connecticut General Statutes in September 2014. It is maintained by the Division of Emergency Management and Homeland Security (DEMHAS) in DESPP. The SRF is designed primarily to direct incident command and to update and establish communications protocols and procedures for departments collaborating on disaster response and recovery. The SRF is focused on life, health, safety, and financial accounting.

## *Analysis*

The SRF was not intended to address historic resources and the potential for inadvertent adverse impacts to those resources during response and recovery. A recommendation in the ongoing update to the Connecticut HMP should be to address this important issue in a meaningful manner in the next update of the State Response Framework.

## Connecticut Disaster Debris Management Plan

Developed under the authority of the Connecticut General Statute, Title 28, Chapter 517, the Connecticut Disaster Debris Management Plan last was updated in 2013. The Plan establishes a framework for state agencies and municipalities to manage debris generated by disasters. Its goal is prompt and efficient recovery through emergency waste management practices that are cost-effective and that consider human health and the environment. It looks at debris modeling and estimates volume of waste based on different storm scenarios. It is not focused on protection of resources, historic or otherwise.

## *Analysis*

Although not intended to address protection of historic or cultural resources, post-event debris removal has the potential to affect historic resources unintentionally. Future updates to the Disaster Debris Management Plan should identify the importance of considering historic resources, including built and archaeological historic properties, in siting of debris staging or operations areas.

## Summary

Greater integration of historic resource resiliency in the state's planning, emergency, and disaster response documents will address the segregation of historic preservation concerns from the planning process and advance the discussion toward proactive, holistic resiliency planning. Integration of historic preservation issues in state-level planning will elevate the awareness of participating agencies to historic resource issues and further inform local planning efforts.

## **Regional and Municipal Planning Instruments: Gap Analysis**

In Connecticut, planning and land use policies primarily are developed by local agencies. Many state plans are mirrored by local plans required under state statute or required for eligibility for specific funding sources. Hazard Mitigation Plans are an example of the latter category. Local planning documents can be tailored to local conditions with a greater degree of specificity and can provide direction for immediate local action. After a disaster, localities are the first responders for emergency management and disaster recovery. The responsibility for damage assessments and grant processing for local historic resources often rests with a town's Planning and Zoning staff.

Data for 91 municipalities in Fairfield, New Haven, Middlesex, and New London Counties were analyzed under this study. Each gap analysis included a review of the following documents, when available:

- Hazard Mitigation Plans
- Plans of Conservation and Development
- Coastal Resilience Plans
- National Flood Insurance Program ordinances and/or regulations
- Historic Preservation Ordinances and
- Emergency Operations Plans

The analyses gauged the extent to which towns addressed historic preservation in natural hazards planning; identified areas where changes might be made; and supported discussions on findings and recommendations with local officials during technical assistance meetings. A summary of findings for the gap analysis of municipalities is followed below by general recommendations to integrate historic resources into local hazard planning documents.

### Hazard Mitigation Plans

Hazard Mitigation Plans (HMPs) identify risks and vulnerabilities associated with natural disasters and develop long-term strategies for protecting people and property from hazards. A FEMA-approved HMP is a condition for certain types of disaster recovery assistance, including funding for mitigation projects, such as building elevation or relocation, that most likely would extend to historic properties. All the municipalities in this study maintain HMPs at the municipal level or are included in regional HMPs coordinated by regional Councils of Government. FEMA has developed a manual for integrating historic properties and cultural resources into hazard mitigation planning guidance documents (FEMA 2005).

### *Analysis*

Most jurisdictions in the four counties encompassed by this project are participants in regional HMPs developed by the Councils of Government. A small number of communities have stand-alone plans. Fewer than 10 percent of the municipalities in the affected counties reference historic resources in the hazard identification and risk assessment sections of HMPs, and even fewer include historic resources in the capability assessment sections. Those that do reference historic resources do so in a general way. None of the plans identify mitigation strategies or actions that address specific historic resources, though a small number include general strategies (e.g., install shutters on “older” and “historic” structures). Many plans identified strategies or actions that may indirectly benefit historic properties. These include resiliency upgrades to historic municipal buildings or high priority for snow removal from roofs. One theme identified in many of the plans was concern over the ability of older buildings to withstand high winds and seismic events. It also was noted that the Mohegan and Mashantucket Pequot Tribes expressed interest in sacred lands and burial grounds, which highlights concerns for cultural resources other than historic buildings and structures. The risk and vulnerability assessments in each plan were intended to quantify and rank resources at risk to inform mitigation investments. No specific quantification of historic resource vulnerability was identified. Historic resources are included in aggregate with overall vulnerability of asset classes but are not specifically called out.

## Plans of Conservation and Development

State statute (Section 8-35a) directs every Council of Government and municipality (Section 8-23) in Connecticut to prepare and adopt a Plan of Conservation and Development (POCD). A POCD assesses existing conditions in a council of government area or municipality, develops a blueprint for development and conservation priorities and goals for the next decade, and presents a policy guide for achieving goals. It is designed to guide development and infrastructure investment through appropriate development policies and land use regulations. A POCD is revised, amended, and re-adopted every 10 years.

Regional and local POCDs are required to address historic resources by CGS Sections 8-35a(2)(d) and Section 8-20, respectively. The growth principles of such plans include Section (e)(1)(F)(iv) “conservation and restoration of the natural environment, cultural and historical resources and existing farmlands.” Municipal POCDs are not specifically required to address historic resources in hazard areas.

### *Analysis*

Most municipal POCDs address preservation of historic resources in general or in response to development pressures. Few specifically include protection planning for historic properties from natural hazards. The Town of Groton is the only municipality reviewed that specifically identified the nexus and specific associated actions. A growing number of plans include specific hazard or flood chapters. Overall, these chapters are general and reference hazard mitigation plans. None addressed historic resources in a meaningful way. Plans now are required to consider the impacts of climate change; however, the 10-year update cycle has delayed inclusion of those considerations in many plans.

## Coastal Resilience Plans

Coastal Resilience Plans (CRPs) address the current and future social, economic, and ecological resilience of a municipality in response to anticipated effects of sea level rise and increases in the frequency and severity of storm surge, coastal flooding, and erosion. These plans are not required by state or federal laws; rather, they are developed voluntarily by communities as tools to consolidate disparate planning, development, and regulatory frameworks for coastal resilience.

### *Analysis*

A small number of CRPs have been developed in Connecticut. Communities with plans completed or under way include:

- Town of Guilford
- Town of Branford
- City of Milford
- Town of Madison
- Town of Stratford
- Town of Old Saybrook (under way)
- Town of Waterford (under way)
- Town of Stonington (under way)
- City of West Haven (under way)

The Town of Groton has a municipal coastal plan, which includes resiliency recommendations for structures in historic districts. The Town of Stratford’s plan discusses the vulnerability of the Stratford

Center National Register Historic District and Academy Hill area to coastal flooding. In Chapter 6 of the Stratford plan, mitigation activities are discussed and related to different funding mechanisms. Other completed plans do not address historic preservation specifically. However, plans under development for West Haven and Old Saybrook will address historic resources. In addition to “stand-alone” CRPs, 10 municipalities in the study area are included in “The Southern Connecticut Regional Framework for Coastal Resilience” (“Regional Framework”) project. The Framework does not direct comprehensive municipal-level planning; rather, it is a guide on how green infrastructure, such as living shorelines, can be incorporated into local or regional resilience planning and projects.

### Local Ordinances and Regulations

A community’s municipal code of ordinances and regulations constitutes a body of law and serves as the main administrative tool for the community’s governing body. Incorporating an objective for the protection of historic resources from natural hazards into the municipal code of ordinances or the municipal zoning regulations is recommended.

#### *Analysis*

All the communities reviewed participate in the NFIP and have incorporated NFIP regulations into municipal ordinances or municipal zoning regulations. The majority have adopted FEMA’s definition of “substantial damage” and FEMA’s criteria for “variance” that allow for exceptions to the floodproofing or elevation of historic structures. A small number of municipalities have adopted variations on the FEMA language and do not explicitly exempt historic structures from regulations. While applying the FEMA minimal standards for substantial improvements to historic buildings (i.e., elevation or floodproofing) may increase the level of protection from flooding for historic buildings, historic property integrity may be significantly diminished by such measures.

A majority of the community zoning regulations address historic preservation. These regulations vary significantly. None of the zoning regulations address historic buildings within the context of hazards. None of the municipalities with historic preservation ordinances specifically address natural hazards in those instruments.

Common themes noted in the analysis of zoning regulations and NFIP ordinances include the existence of town center historic districts, rules regarding excavation and historic resources, rules regarding wireless communication towers in historic districts or design districts, and limitations on signage in historic districts or design districts. Historic resources tend to be addressed in generalities, and different resource classes usually are not called out. Importantly, the nexus between resources and hazard risks is not included in any of these sources. Most communities do a good job of addressing historic and cultural resource protection within ordinances and regulations. Most also do a good job of addressing flood hazards. However, none identify the intersection between the two.

### Emergency Operations Plans

Emergency Operations Plans (EOPs) maintained by the emergency management director are designed to direct incident command, to update and establish communications protocols, and to outline procedures for different departments collaborating to address disasters. In EOPs, recovery is focused on life, health, safety, and financial accounting.



## Analysis

Connecticut EOPs are not intended to focus on protection of resources pre-disaster. Rather, they are focused on operations during the response, and to a lesser extent, recovery. There would be value to addressing the potential for inadvertent impacts to historic and cultural resources during these phases and referencing other plans to foster awareness.

## Integrating Historic Preservation at the State Level: Recommendations

Many of the planning documents listed below are organized similarly; therefore, there may be similar methods for integrating historic resources for several of the documents.

**Table 8. Integrating Historic Preservation at the State Level: Recommendations**

Plan Name	Dates	Agency	Existing Historic Resource Section	Section to Include in Next Plan	Date of Next Update
State Hazard Mitigation Plan	2014	DEEP DEMHS	Yes	<ul style="list-style-type: none"> <li>a. Include state-owned historic resources and other historic resources in hazard and risk assessments</li> <li>b. List Historic Resources that are also critical facilities</li> <li>c. Include historic resource value analysis in terms of social and economic loss</li> <li>d. Cite specific mitigation actions that directly protect valued historic resources</li> </ul>	2019 - Revision Currently Pending
State Plan of Conservation and Development	2018- 2023	OPM	Yes	<ul style="list-style-type: none"> <li>a. Growth Management Principle #4</li> <li>b. Address hazards that threaten historic resources within the historic resources chapter or element</li> <li>c. Address historic resources that are vulnerable to hazards within sea level rise discussion</li> <li>d. Quantify historic resources at risk using hazard data and historic resources point data</li> <li>e. Include strategies that address risks to historic resources from natural hazards in the POCD implementation matrix</li> <li>f. Note municipal staff or commissions that are designated to plan and coordinate review for these resources</li> </ul>	Pending Adoption
Connecticut Climate Preparedness Plan	2013	DEEP CIRCA	N/A	<ul style="list-style-type: none"> <li>a. Review recommendations to see how they can be integrated with preservation priorities</li> <li>b. If an update occurs, incorporate historic resources into risk and vulnerability assessments</li> <li>c. Incorporate geographic historic resources in climate change mapping</li> <li>d. Ensure continued and emergency access to historic properties and districts</li> </ul>	

Plan Name	Dates	Agency	Existing Historic Resource Section	Section to Include in Next Plan	Date of Next Update
Connecticut State Response Framework	Version 4.1, 2014	DEHMS	N/A	<ul style="list-style-type: none"> <li>a. Section 3: include Historic Preservation organizations in Functional Roles</li> <li>b. Section 4.4: include SHPO in coordination with other state agencies</li> <li>c. Section 5: Include historic preservation actions in SOP</li> <li>d. Appendix A: Add Historic/Cultural Preservation ESF (within #11?)</li> </ul>	
State Disaster Debris Management Plan	Revised June 2013	DEEP	N/A	<ul style="list-style-type: none"> <li>a. Add a Historic Resource Recovery Annex with mapping to alert responders to sensitive areas</li> <li>b. Identify a Historic Resource Recovery point person in the plan</li> <li>c. Include a damage recovery plan specific to historic resources</li> <li>d. Include specific vulnerable sites if possible</li> </ul>	

### Integrating Historic Preservation at the Local Level: Recommendations

Many of the regional and local planning documents listed below are organized similarly, particularly the hazard mitigation and emergency response plans. There are a number of methods for incorporating historic resources into the plans, as shown in the list of recommended strategies and actions. POCDs are required to cover historic resources, and they usually address natural hazards in some capacity, so these plans are a natural fit for integration at the regional and local level.

**Table 9. Integrating Historic Preservation at the Local Level: Recommendations**

Plan Name	Dates	Likely Agency	Current Required Historic Resource Section	Recommended Sections
Regional or Local Hazard Mitigation Plan	Every 5 years	COGs or EMD & P&Z	N/A	<ul style="list-style-type: none"> <li>a. Include local historic resources and other historic resources in hazard and risk assessments via mapping, description and quantification of vulnerability</li> <li>b. List historic resources that are also critical facilities</li> <li>c. Include historic resource value analysis in terms of social and economic loss</li> <li>d. Cite specific mitigation actions that directly protect valued historic resources</li> </ul>
Regional Plan of Conservation and Development	Every 10 years	COGs	<ul style="list-style-type: none"> <li>a. POCDs are required to address historic resources (State Statute Section 8-23).</li> <li>b. POCDs are not required to address historic resources in hazard areas, but usually address natural hazards in some capacity</li> </ul>	<ul style="list-style-type: none"> <li>a. Address hazards within the historic resources chapter or element; include point data</li> <li>b. Address historic resources within the hazards chapter or element</li> <li>c. Describe and quantify historic resources at risk</li> <li>d. Include strategies that address risks to historic resources from natural hazards</li> </ul>

<b>Plan Name</b>	<b>Dates</b>	<b>Likely Agency</b>	<b>Current Required Historic Resource Section</b>	<b>Recommended Sections</b>
Local Plan of Conservation and Development	Every 10 years	Local P&Z staff	<ul style="list-style-type: none"> <li>a. POCDs are required to address historic resources (State Statute Section 8-20(e)(1)(F)(iv))</li> <li>b. POCDs are not required to address historic resources in hazard areas, but usually address natural hazards in some capacity</li> </ul>	<ul style="list-style-type: none"> <li>e. Address hazards within the historic resources chapter or element with associated maps</li> <li>f. Address historic resources within the hazards chapter or element</li> <li>g. Describe and quantify historic resources at risk</li> <li>h. Include strategies that address risks to historic resources from natural hazards</li> </ul>
Resiliency Plan	2005	DEEP	N/A	<ul style="list-style-type: none"> <li>a. Incorporate historic resource locations into risk and vulnerability assessment</li> <li>b. Use neighborhood-level concept planning for historic districts</li> <li>b. Note importance of ensuring emergency access to historic properties</li> </ul>
Flood Hazard Regulations	Version 4.1, 2014	P&Z	N/A	<ul style="list-style-type: none"> <li>a. Clarify substantial improvement and variance language in floodplain regulations</li> <li>b. Formalize variance procedure in floodplain regulations</li> </ul>
Historic District Ordinances		P&Z, Historic Commission	N/A	<ul style="list-style-type: none"> <li>a. Develop resiliency standards for local historic districts</li> <li>b. Incorporate other classes of resources (i.e., archaeological, historic landscapes) in revisions to historic district ordinances</li> <li>c. Develop guidelines for building elevations within historic districts</li> </ul>
Zoning Regulations		P&Z, Historic Commission	N/A	<ul style="list-style-type: none"> <li>a. Amend zoning and subdivision regulations to allow the commissions to require archaeological and historic surveys prior to approval</li> <li>b. Amend regulations to support redevelopment and creative reuse of historic properties while maintaining historic characteristics</li> </ul>
Emergency Operations Plan	Revised June 2013		N/A	<ul style="list-style-type: none"> <li>a. Address historic resources in an annex</li> <li>b. Add a recovery/damage assessment annex</li> <li>c. Point data can used by responders to understand historic resources</li> <li>d. Designate specific department or individual responsible for checking on the status of historic resources during and after a disaster</li> <li>e. Develop EM protocols to ensure response does not harm historic resources</li> </ul>

At the local level, several agencies can assist with disaster recovery for historic structures, sites, and artifacts, including:

- FEMA and the Smithsonian Institution co-sponsor the Heritage Emergency National Task Force, a partnership of 42 national service organizations and federal agencies created to protect cultural heritage from the damaging effects of natural disasters and other emergencies (website: <https://culturalrescue.si.edu/resources/heritage-emergency-national-task-force/>).
- The National Heritage Responders (NHR)—formerly the American Institute for Conservation–Collections Emergency Response Team (AIC–CERT)—responds to the needs of cultural institutions during emergencies and disasters through coordinated efforts with first responders, state agencies, vendors, and the public. Volunteers can provide advice and referrals by phone. Requests for onsite assistance will be forwarded by the volunteer to the NHR Coordinator and Emergency Programs Coordinator for response (website: <http://www.conservation-us.org/resources/disaster-response-recovery#.WQNSyWfHeUk>).
- The National Center for Preservation Technology and Training, which provides information via the National Park Service website on how to stabilize historic structures post-disaster, as well as standard post-disaster documentation forms and checklists, and even a post-disaster assessment app (website: <https://www.ncptt.nps.gov/articles/disasters/>).

These resources can provide training for local “on the ground” responders such as historic district commission members or other local volunteers with local historic preservation organizations. Regional coordination of training opportunities would provide more capacity and the ability for more extensive mutual-aid collaboration for widespread natural disasters such as hurricanes, nor’easters, or storm surge events that damage larger geographic areas.

## **Adapt: Resiliency Strategies and Historic Resources**

Resilience is the capacity of a system (such as infrastructure, government, business, or resources) to absorb and recover from an adversity. Coastal resilience, referring specifically to coastal hazards such as sea level rise, increased flooding, and more frequent and intense storm surges can be achieved by mitigating coastal hazards and decreasing coastal vulnerabilities through adaptation and planning. Integrating historic preservation into coastal resilience presents a unique challenge, since adaptation and mitigation must be balanced with the preservation of the character of historic resources. Thus, historic resource resilience can be defined as the ability of such a resource to resist, absorb, and recover from adversity while maintaining the defining characteristics that enable it to contribute to a community’s cultural identity, sense of place, and cohesion.

### Adaptation: Nonstructural

Nonstructural measures apply to all resources types and include preparedness, emergency response, retreat, and regulatory and financial measures to reduce risk. Many of these measures offer opportunities to ensure that the consideration of historic resources is integrated into land use, hazard mitigation, resiliency, and emergency management planning efforts. These activities increase awareness, community support, and often provide proactive planning for preservation grant applications while supporting capital improvement planning. The geospatial data provided as part of this project will assist in quantifying and visualizing at

risk resources, thereby allowing planning to move from abstract policy statements to targeted risk-reduction strategies.

### Adaptation: Structural

Structural measures are constructed solutions such as hardscape alternatives including dikes, seawalls, groins, jetties, temporary flood barriers, and softscape solutions such as dunes, living shorelines, beach nourishment, and riverbank restoration. Excavation associated with such projects can result in unexpected discovery and/or disturbance to archaeological sites. Archaeological survey and/or unexpected discovery provisions for archaeological sites should be requirements for all such projects.

During Hurricane Sandy, many residential structures along the Connecticut shore were damaged by storm surge or floodwater. Many of those houses were over 50 years of age and included designated historic properties or contributing elements to historic districts. As noted above, local municipalities require buildings located within a FEMA designated Special Flood Hazard Area (SFHA) with estimated repair costs exceeding 50 percent of the value of the structure to comply with current floodplain management regulations under the local permitting process. While commercial historic structures may be wet- or dry-floodproofed to minimize future damage, residential buildings must be elevated above the identified BFE. FEMA minimum standards (44 CFR 60.3) allow communities to adopt regulations for variances to the elevation standard for historic buildings. Balancing the dangers of future events, the existing recovery framework, and historic values is a unique challenge.

Ideally, any measures or combination of measures should be robust enough to provide adequate protection and flexible enough to allow adaptation to changing conditions. Such robustness and flexibility typically require a combination of methods rather than a single solution. Structural measures can be site-specific, neighborhood-scale, or large-scale, protecting multiple square miles of infrastructure. Site-specific measures pertain to floodproofing of specific structures on a case-by-case basis. Neighborhood-scale measures apply to specific groups of buildings adjacent to one another. Large-scale structures might include dike and levee systems or tide gates that can prevent tidal surge from moving upstream.

### Retreat and Abandonment

There may be circumstances where a historic resource or site cannot be protected from future hazards such as sea level rise and loss of land area. Although relocation of a resource away from its historic context generally is not a preferred preservation strategy, the degree of threat and significance of the resource may require consideration of this option on a case-by-case basis. The cultural or historic value of a building or structure may warrant relocation to achieve long-term preservation, with impacts to integrity limited through re-creation of compatible settings. There may be cases where location and setting are integral to the historicity of a resource and relocation is not possible without substantial compromises to resource integrity. The geospatial data submitted under this study provide a tool necessary for future review and analysis of cultural resources relative to current and future risk factors.

Loss of historic and cultural resources is never easy for the historic preservation community. However, there may be circumstances where intentional loss is a defensible approach, whether because of limited resources or to the recognition that the evolution of the site over time contributes to its cultural importance. This strategy can be supported under NPS guidance PM 14-02 that states “*Responsible stewardship requires making choices that promote resilience and taking sustainable management actions. Funding temporary repairs for resources that cannot, because of their location or fragility, be saved for*

*the long term, demands careful thought. Managers should consider choices such as documenting some resources and allowing them to fall into ruin rather than rebuilding after major storms.”* (U.S. Department of the Interior 2014).

Connecticut has lost historic shoreline properties over the years. Storms, redevelopment, and transportation improvements were among the factors that contributed to the decline of historic trolley lines and changes to beach colonies. The ability to preserve sites from an engineering perspective and the costs associated with preservation will determine the long-term feasibility of historic shoreline property preservation.

## CHAPTER VI

# HISTORIC RESOURCE RESILIENCY AND THE CONNECTICUT STATE HISTORIC PRESERVATION PLAN: 2018

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As Connecticut's lead agency in historic preservation, the Connecticut SHPO directs statewide preservation planning in accordance with Section 101(b)(3)(c) of the National Historic Preservation Act, as amended, and with program requirements set forth in Chapter 6 of the Historic Preservation Fund Grants Manual (NPS 2007). As part of the SHPO's Historic Preservation Planning Program, a Comprehensive Statewide Historic Preservation Plan (State Plan) is prepared every five years to refine the vision for historic preservation in the state and to define the future direction for the state office during the planning cycle.

Many public, private, and professional organizations participate in the development of the State Plan. The plan addresses the full range of Connecticut's historic resources including buildings, structures, objects, districts, and sites. The plan is designed to be a focused and concise strategic document that contains:

- Plan methodology, including public participation;
- Summary assessment of issues facing historic preservation, including threats and opportunities;
- Guidance for resource management in the state with policies, strategies, goals, and objectives;
- Time frame for implementing the plan and the anticipated date of the next revision; and,
- Bibliography.

Connecticut's first State Plan was developed in 1997 by the Connecticut Historical Commission. Subsequent plans were produced in 2005 and 2011.

### **Threats and Opportunities to Historic Preservation in Connecticut from Climate Change**

Since the adoption of the last State Plan in 2011, climate change and associated sea level rise have emerged as serious and immediate threats to the preservation of Connecticut's historic properties. As the science of climate change has advanced with patterns of projected change demonstrated empirically, threats to historic resources have become a public, private, and professional concern. Three distinct but related

major categories of impacts to historic properties can be extrapolated from current scientific data and from our current national posture.

### Storm Events

The first major threat is the increased number, severity, and frequency of storm events with the potential to result in substantial damage to and/or loss of historic properties. Resiliency planning, emergency operations protocols, disaster recovery protocols, and adaptation responses that do not take into account historic properties and heritage values pose unintended threats to historic resources. Existing programs, such as the National Flood Insurance Program (NFIP), inadvertently operate as a disincentive to the preservation of historic buildings and structures. Recovery and adaptation measures advanced under such agencies as the Federal Emergency Management Agency (FEMA) often consider historic properties through post-event consultation on mitigation projects pursuant to federal historic preservation law and implementing regulations (36 CFR 800). While proactive planning for historic resources is encouraged by FEMA through Hazard Mitigation Plans (HMPs), federal and state agencies may differ on the definition of significant historic resources and on the range of adaptation strategies appropriate to the long-term preservation of designated historic properties. Elevation, relocation, and abandonment are among these debated strategies.

Inclusion of historic resources in state and local resiliency plans will require the involvement and technical assistance of the professional preservation community. While existing resiliency planning efforts generally are undertaken by dedicated planning professionals who are sympathetic to historic preservation, these planners may have limited experience or technical training in the objectives, standards, and guidelines of historic resources management.

### Sea Level Rise

The second category of impact is sea level rise, which has the potential to directly threaten almost 9 percent of the state's historic properties based on Connecticut's 2016 data for National Register listings. Major threats associated with sea level rise are resource inundation, loss or damage from increased storm surge, loss of access and services related to disruptions to infrastructure including bridges, roads, and services, and loss of resources related to the implementation of abandonment as an adaptation measure.

Structural adaptation measures, such as engineering solutions and infrastructure improvements designed for community protection, also can enhance the resiliency of historic resources. Historic properties should be considered among the community assets worthy of protection in planning and decision making in developing such adaptation measures. Technical assistance in appropriate preservation planning measures also is required. Resource-specific structural modifications such as elevation and weatherproofing may be effective, provided that they do not compromise the integrity of properties. The life expectancy of the improvement should be factored into adaptation decisions.

Prioritizing the cultural value of historic properties is a foreign and uncomfortable concept in preservation practice. However, the state and its municipalities may eventually face decisions on the relative significance of historic properties and about achievable and appropriate levels of treatment for adaptation.



## Environmental Change

The third category of threat is associated with the trajectory of environmental change that will affect the physical patterns of response of historic resources as self-contained systems over seasonal cycles. New and unexpected conditions conducive to historic material deterioration are anticipated to emerge in the state; they will require increased conservation intervention. Threats include, but are not limited to, increased temperatures resulting in increased thermal movement; changes in expansion and contraction rates associated with altered seasonal cycles; and invasive species, including vegetation, insects, biological, and microbiological agents, that are anticipated to become more common and to pose increasing threats through infestation or decay.

Integration of historic resources within the framework of hazard and resilience planning on the state and local levels is a logical and achievable goal within the planning cycle for the State Plan. This goal offers the advantages of integrating heritage values within well-developed planning models that interface with federal programs. This goal will achieve consideration of those values in the development of response strategies related to climate change and events as conditions progress. The following goals, objectives, and strategies were developed by analyzing local-level resiliency planning for threatened historic resources in the four coastal counties and 28 municipalities affected by Superstorm Sandy. Those lessons learned have broad applicability to the state as a whole.

### **Goal: Integrate historic properties and cultural heritage values in Hazard Resiliency Planning on the state and local levels.**

The changing character and severity of weather events, coupled with projections for sea level rise, pose direct and dramatic threats to Connecticut's historic properties and heritage assets. Anticipated hazards to historic properties from weather events and sea level rise include, but are not limited to:

- Inundation from storm surge and riverine flooding;
- Structural stress from high winds;
- Erosion from flooding, storm surge, and high winds;
- Debris damage related to high winds and flooding;
- Structural damage from snow loads; and,
- Freeze-thaw damage related to extreme temperature swings.

These environmental threats mandate meaningful consideration of heritage resources in hazard resiliency planning and disaster recovery planning on the local and state levels. Prevailing hazard mitigation programs operate within a complex and comprehensive framework of federal, state, and local plans and guidelines, many of which determine eligibility for certain types of disaster assistance.

The existing planning structure, however, actually provides important and practical opportunities to integrate historic preservation concerns throughout the four key stages of the resiliency cycle (see fig. 1).

- A. Objective: Integrate historic properties and heritage values in the Prepare Stage of the resiliency cycle on the state and local levels.
  - **Strategy: Formally Integrate Historic Preservation in the *State Hazard Mitigation Plan*.**  
The State Hazard Mitigation Plan (HMP) identifies risks and vulnerabilities associated with natural disasters; it develops strategies for dealing with these risks over a five-year planning horizon. A FEMA-approved HMP is a condition for qualifying for certain types of disaster assistance, including funding for mitigation projects that may support the preservation of historic properties. For example, building elevation and relocation, as well as other public

assistance may be eligible for support in a post-disaster environment. An approved State HMP qualifies Connecticut as eligible for federal funding equal to 15 percent of the total disaster damages in a presidentially declared disaster under the FEMA Hazard Mitigation Grant Program (HMGP).

The State HMP currently does not discuss historic resources, nor does it have a Historic Resource Annex. These items should be included in the next State Plan update. It should be noted that all HMGP grant applications include an environmental assessment checklist requiring the consideration of archaeological and built resources through SHPO consultation.

- Strategy: Refine historic preservation policies to reflect resiliency goals in future updates of the *State Plan of Conservation and Development*.

Connecticut Statutes Sections 16a-25 through 16a-30 require the State of Connecticut to prepare and adopt a plan for conservation and development (POCD) every five years. The existing POCD, which established a set of Conservation and Development Policies, was adopted by the state's Continuing Legislature Committee on Planning and Development. The recently proposed draft provides general policy statements; it also references other state planning documents, including the Connecticut State Historic Preservation Plan and the Hazard Mitigation Plan.

The Draft Plan includes the following state agency policies with potential historic preservation impact:

- Preserve and Protect: Connecticut Heritage Areas, archaeological areas of regional and statewide significance, and natural areas, including habitats of endangered, threatened and special concern species, other critical wildlife habitats, river and stream corridors, aquifers, ridgelines, large forest areas, highland areas, and Long Island Sound.
  - Revitalize: rural villages and main streets by promoting the rehabilitation and appropriate reuse of historic facilities, such as former mills, to allow a concentration of higher density or multiple use development where practical and consistent with historic character.
  - Minimize: the potential risks and impacts from natural hazards, such as flooding, high winds, and wildfires, when siting infrastructure and developing property. Consider potential impacts of climate change on existing and future development.
- Strategy: Integrate historic preservation resiliency into future revisions of the Connecticut Climate Preparedness Plan.  
As authorized under Public Act No. 08-98—An Act Concerning Connecticut Global Warming Solutions, the Adaptation Subcommittee of the Governor's Steering Committee on Climate Change developed and issued a draft Connecticut Climate Preparedness Plan in early 2011. The subcommittee, which included federal, state, and local officials, academics, nongovernmental organizations, and legislators, was established to “evaluate the projected impacts of climate change on Connecticut agriculture, infrastructure, natural resources and public health,” and to develop strategies to lessen those impacts. It is likely that revisions to this document will be spearheaded by the Connecticut Institute for Resiliency and Climate Adaptation (CIRCA) at the University of Connecticut, which was established in 2013.

Opportunities to address historic preservation concerns are embedded in the five major themes currently included in the Climate Preparedness Plan:

- Intensify efforts to ensure preparedness planning;
- Integrate climate change adaptation into existing plans;
- Update existing standards to accommodate change expected during infrastructure design life;
- Plan for flexibility and monitor change; and
- Protect natural areas and landscape features that buffer potential impacts from climate change.

▪ Strategy: Integrate historic preservation values in the Connecticut State Response Framework.

Emergency Operations Plans (EOPs), maintained by emergency management directors, are designed to direct incident command, to establish communications protocols, and to articulate specific procedures for the different departments that collaborate to address disasters. In EOPs, recovery is focused on life, health, safety, and financial accounting. Historic Preservation values should be among the considerations for execution of this overarching mission.

▪ Strategy: Integrate historic preservation values in Connecticut Disaster Debris Management Plan

Recognizing historic resources in the state's planning and emergency and disaster response documents will help bring historic preservation to the forefront by emphasizing the role that these resources play in our cultural identity, economic vitality, and in the fabric of our current built environment. It also will promote exposure to the participating agencies of the special needs and requirements of historic properties for resiliency initiatives and post-disaster analysis and recovery efforts following significant hazard events.

▪ Strategy: Integrate historic preservation values in regional and municipal planning instruments.

In Connecticut, planning and land use policies are controlled primarily by local agencies. Many state plans are mirrored by local plans as required by state statute, and/or required for funding eligibility through such sources as the HMP. Local planning documents often contain a greater level of specificity, which may include direction for immediate action. Following a disaster, local resources are the first on the ground to perform initial and ongoing emergency management and disaster recovery. In addition, the responsibility for damage assessments and grant processing for local historic resources often rests with Planning and Zoning staff within the local municipality.

After Superstorm Sandy, the Connecticut SHPO undertook a resiliency planning initiative with the support of the NPS in the four coastal counties affected by the storm. The methodology included data collection, charrettes, and municipal meetings. This initiative resulted in the development of a Best Practices Guide to inform the integration of historic preservation in the following local plans:

- Hazard mitigation plans;
- Plans of conservation and development;
- Coastal resilience plans;
- National Flood Insurance Program ordinances and/or regulations;
- Historic preservation ordinances; and
- Emergency operations plans.

The methodologies and best practices generated under this initiative should be expanded throughout the state.

- B. Objective: Integrate historic properties and heritage values in the Withstand Stage of the resiliency cycle on the state and local levels.
- Strategy: Assess the Strengths, Weaknesses, Opportunities, and Threats associated with implementation of the historic preservation provisions of the above plans, post-event. Revise protocols during the next planning cycle, as appropriate.
  - Strategy: Establish regular communication with local preservation communities to compile data on damage or threats to resources to assist SHPO staff in prioritizing post-event action.
- C. Objective: Integrate historic properties and heritage values in the Recover Stage of the resiliency cycle on the state and local levels.
- Strategy: Establish protocols with the preservation community and constituency for unified and complementary response to recovery.
  - Strategy: Implement aggressive public outreach efforts to target historic property owners, property managers, and local officials on eligibility and requirements for recovery funding, as appropriate.
  - Strategy: Designate a staff Point of Public Contact (PPC) who is knowledgeable about recovery programs and requirements related to historic preservation. Prepare a list of contacts for other recovery programs for distribution to the public, as a courtesy.
  - Strategy: Develop guidance for local Historic District Commissions for review of projects involving elevation and/or relocation of designated properties.
- D. Objective: Integrate historic preservation and heritage values in the Adapt Stage of the resiliency cycle on the state and local levels.
- Strategy: Review and synthesize federal policies and technical literature on adaptation as it applies to historic preservation for applicability to Connecticut.
  - Strategy: Establish criteria for assessing resource vulnerability for consideration in prioritizing preservation funding and support.
  - Strategy: Initiate discussions with the preservation community on the range of adaptation approaches (resource hardening, elevation, moving, abandonment) and criteria for implementation.
  - Strategy: Develop and distribute technical guidance to historic property owners on interim measures to limit or avoid property damage.
  - Strategy: Monitor proposals for infrastructure improvement projects for opportunities to maximize resiliency design benefits for historic resources.

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Revolutionary Connecticut

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