
TOWN OF COLCHESTER ANNEX DOCUMENT

Southeastern Connecticut Council of Governments
Multi-Jurisdictional Hazard Mitigation and Climate Adaptation Plan Update

March 2023



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1. Introduction

1.1. Purpose of Annex

The planning process for the multi-jurisdiction hazard mitigation plan update commenced in April 2022 and ended in December 2022, spanning a period of nine months. The planning process included 24 jurisdictions (22 municipalities and two tribal governments) with two participating together (Griswold and Jewett City) for a net total of 23 local planning teams represented. For this 4th edition of the plan, SCCOG elected to link the planning process to a parallel planning process administered by the Connecticut Institute for Resilience and Climate Adaptation (CIRCA) that is known as “Resilient Connecticut 2.0” (stylized as *Resilient Connecticut*). The *Resilient Connecticut* program is described on CIRCA’s web site at <https://resilientconnecticut.uconn.edu/> and the expansion of the program into southeastern Connecticut is described at <https://circa.uconn.edu/2022/02/23/resilient-connecticut-expands-statewide/>.

The linkage of the two planning processes was advantageous for the following reasons:

- Incorporation of climate change into the hazard mitigation plan update
- Increased interest from the local communities, especially for those interested in developing climate adaptation strategies.
- Direct incorporation of climate change vulnerability products developed by CIRCA including the Climate Change Vulnerability Index (CCVI) for flood and extreme heat vulnerabilities
- Direct incorporation of combined sea level rise and coastal flood inundation simulations from CIRCA
- Positioning of the SCCOG jurisdictions for new funding sources in Connecticut such as the new Department of Energy and Environmental Protection (DEEP) Climate Resilience Fund (DCRF)
- Consistency with the Governor’s Council for Climate Change (GC3) outcomes from the 2020-2021 planning process
- Positioning of the actions for incorporation on the State’s “resilience project pipeline” per Executive Order (EO) 21-3 issued at the end of 2021

The planning process commenced for the local communities on April 20, 2022 with a presentation to the SCCOG Board. During this presentation, the consultant and CIRCA described the planning process and the approach for incorporating the *Resilient Connecticut* program into the hazard mitigation plan update, and notified the chief elected officials that invitations to local planning meetings would follow at the end of April. Local planning team meetings commenced on May 23, 2022 and ended on July 8, 2022. Workshops with local coordinators were conducted in July and September 2022, and supplemental meetings with water utilities in the region and specific stakeholders continued through November 2022.

1.2. Hazard Mitigation and Climate Adaptation

The primary goal of the previous hazard mitigation plans adopted in 2013 and 2018 was to identify risks to hazards and potential mitigation measures for such hazards in order to **reduce the loss of or damage to life, property, infrastructure, and natural, cultural, and economic resources**. This included the reduction of public and private damage costs. Limiting losses of and damage to life and property was also meant to reduce the social, emotional, and economic disruption associated with a natural disaster.

Coinciding with the incorporation of climate adaptation and the alignment of this HMCAP with the *Resilient Connecticut* planning process administered by CIRCA, five new goals were developed for this HMCAP:

- Ensure that critical facilities are resilient, with special attention to shelters and cooling centers.
- Address risks associated with extreme heat events, especially as they interact with other hazards.
- Reduce flood and erosion risks by reducing vulnerabilities and consequences, even as climate change increases frequency and severity of floods.
- Reduce losses from other hazards.
- Invest in resilient corridors to ensure that people and services are accessible during floods and that development along corridors is resilient over the long term.

2. Community Profile

Colchester is a suburban town of approximately 50 square miles that lies in the northwest corner of New London County and is bordered by the Towns of Lebanon and Bozrah to the east, the Towns of Salem and East Haddam to the south, the Town of East Hampton to the west, and the Towns of Marlborough and Hebron to the north. Colchester is located approximately 25 miles southeast of Hartford, the Connecticut State capital. The Town of Colchester includes the villages of Westchester and North Westchester as well as the Colchester Village historic center.

The most significant surface water bodies in Colchester include the Blackledge River, Salmon River, Deep River, Jeremy River, Meadow Brook, Judd Brook, Deep River Reservoir, and Babcock Pond. In total, there are 16 sub-regional drainage basins in Colchester.




The major transportation routes through town includes Route 2 which extends from the town line with Marlborough in northwest Colchester to the town line with Lebanon in southeast Colchester, Route 11 which extends from central Colchester south into Salem, and Route 16 which runs east-west through the central portion of town from Lebanon in the east to East Hampton in the west. Other important roadways include Routes 149, 85 and 354 enter Colchester from the southern town line with East Haddam (Route 149) and Salem (Routes 85 and 354) and extend northward toward the northern town line with Hebron.

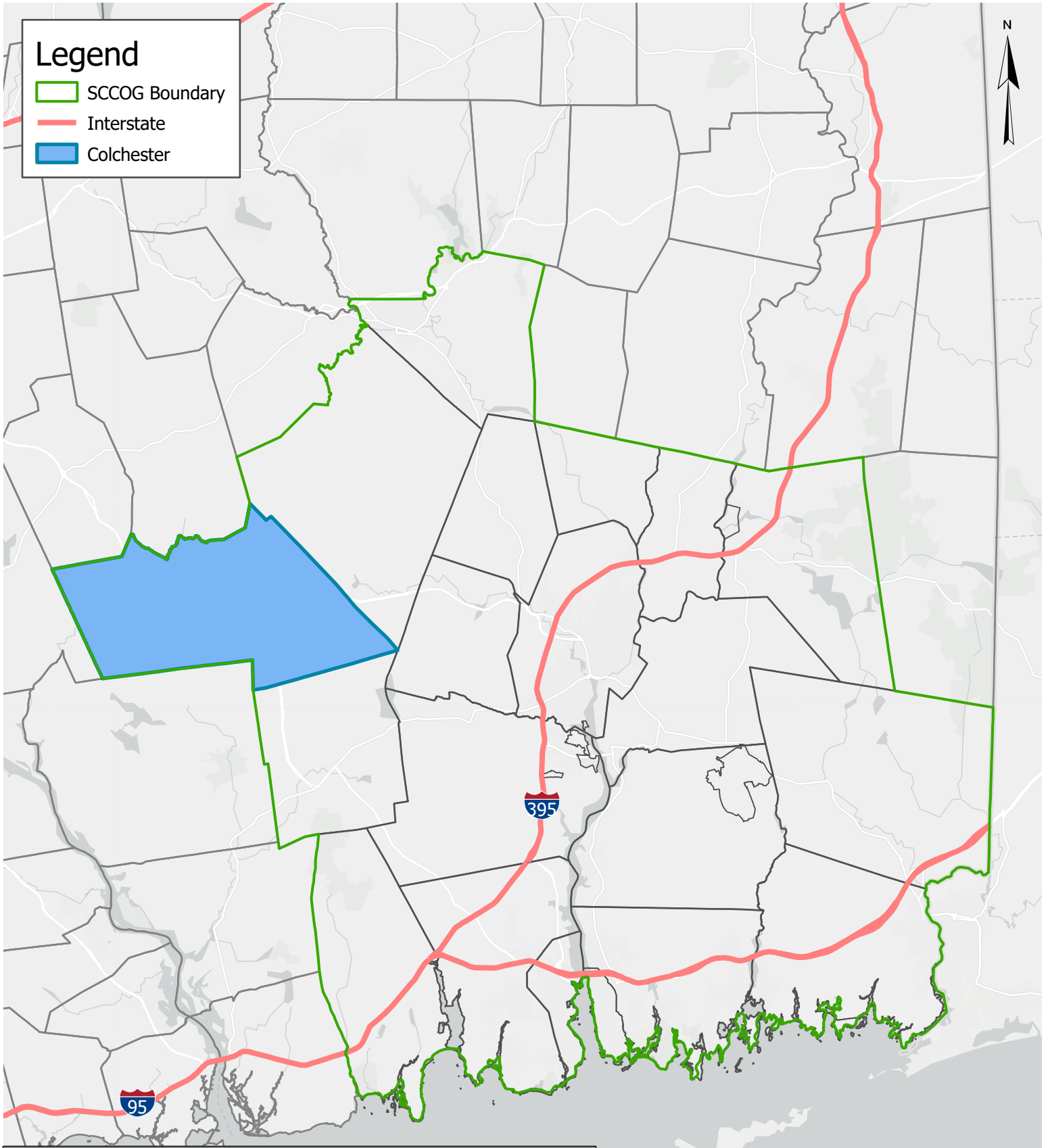
2.1. Physical Setting

Colchester is a suburban town located at the northwestern edge of the SCCOG planning area. Elevations range from approximately 650 feet along Bush Rock Road in the northeast section of Colchester to approximately 75 feet along the Salmon River near the intersection of Comstock Bridge Road and Route 16/Colchester Avenue at the town line with East Hampton. The most densely populated area of town is the Colchester Village Historic District which lies north of the Route 2 and Route 11 intersection in central Colchester where there are residential, commercial and industrial land uses. This area was once an incorporated borough and is listed on the National Register of Historic Places. Much of central Colchester is developed along with a significant amount of land along Route 149 in western Colchester.

Geology is important to the occurrence and relative effects of natural hazards such as earthquakes. Thus, it is important to understand the geologic setting and variation of bedrock and surficial formations in lands underlying Colchester. Dominated by Brimfield Schist, which covers approximately 76% of town stretching across central Colchester, the Town is also covered by two additional bedrock formations: Buttress Dolerite and Hebron Gneiss. Hebron Gneiss covers approximately 24% of outer Colchester with less than 1% covered by buttress Dolerite. There is no defined geographic orientation to the bedrock formations or geologic contacts in town.

Legend

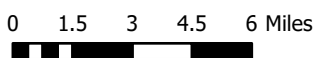
-  SCCOG Boundary
-  Interstate
-  Colchester



Regional Location of Colchester

SCCOG Hazard Mitigation and Climate Adaptation Plan
Town of Colchester

Date: 3/6/2023



Esri, HERE, Garmin, FAO, NOAA, USGS, EPA, NPS, Esri, HERE, Garmin, SafeGraph, FAO, METI/NASA, USGS, EPA, NPS

The Town's surficial geologic formations include glacial till and stratified drift. Refer to the Multi-Jurisdictional HMP for a generalized view of surficial materials. Till contains an unsorted mixture of clay, silt, sand, gravel, and boulders deposited by glaciers as a ground moraine. Areas associated with the majority of major watercourses and waterbodies mentioned in Section 1.2 include fairly extensive areas underlain by stratified drift in Town. The amount of stratified drift present is important as areas of stratified materials are generally coincident with floodplains. These materials were deposited at lower elevations by glacial streams, and these valleys were later inherited by the larger of our present day streams and rivers. The amount of stratified drift also has bearing on the relative intensity of earthquakes and the likelihood of subsidence.

2.2. Drainage Basins and Hydrology

As mentioned in Section 2.1, the most significant watercourses in Colchester includes the Salmon River which begins following the convergence of the significant tributaries of Jeremy Brook and Blackledge Brook in northwestern Colchester and continues into the Town of East Hampton; the Deep River which begins in southeastern Colchester near Route 354 and flows southerly toward the Town of Salem and ultimately to the Yantic River; and Sherman Brook which begins in east-central Colchester north of Route 2 and flows north of Route 2 easterly into the Town of Lebanon towards the Yantic River. Altogether, there are approximately 23 named watercourses and many unnamed small tributaries in Colchester.

There are a total of 16 subregional watershed basins in Colchester including Bartlett Brook, Blackledge River, Deep River, Dickinson Creek, East Branch Eightmile River, Eightmile River, Gardner Brook, Jeremy River, Judd Brook, Meadow Brook, Moodus River, Pine Brook, Raymond Brook, Salmon River, Sherman Brook, and Yantic River. Three subregional drainage basins account for approximately 50% of Colchester's land cover; these are the Meadow Brook, Sherman Brook, and Deep River subregional drainage basins. Meadow Brook covers the majority of land cover in the town, accounting for approximately 7,119 acres or approximately 22% of Town land stretching from southeast to northwest across the central portion of Colchester. Sherman Brook accounts for the second largest amount of land cover 15% (4,765 acres) covering most of the northeastern portion, along the town line with the Town of Lebanon. Thirdly, Deep River accounts for 13% (4,181 acres) of Colchester's land cover including the majority of the southeastern portion of Town stretching from the town line with Town of Lebanon westerly approximately to Route 85 including a majority of the land cover between Route 2 southerly to the town line with the Town of Salem.

The most significant surface water impoundment in Colchester is the Deep River Reservoir which is located in the southeast corner of Colchester and stretches from near the town line with the Town of Lebanon southwest to Route 354 near the town line with Salem.

2.3. Land Use

According to the "Town of Colchester Open Space Plan" (Adopted October, 2006), Colchester had achieved approximately 6,500 acres or 20% open space protection by 2006. According to the 2016 1-meter resolution land cover developed by the NOAA Office of Coastal Management, Colchester is predominantly comprised of mixed forest, with approximately 71.44% of the town classified as such. The second largest land cover type is developed open space, which covers about 8.22%, and next is

developed impervious which is about 5.62% of land cover. All land covers and their percent coverage can be found in Table 2-1.

Table 2-1 Town of Colchester Land Cover

Land Cover Type (2016)	% Coverage
Barren Land	0.39
Cultivated Crops	0.28
Developed, Impervious	5.62
Developed, Open Space	8.22
Grassland/Herbaceous	2.87
Mixed Forest	71.44
Open Water	1.62
Palustrine Aquatic Bed	0.69
Palustrine Emergent Wetland	1.36
Palustrine Forested Wetland	3.96
Palustrine Scrub/Shrub Wetland	0.61
Pasture Hay	2.07
Scrub/Shrub	0.86

2.4. Population, Demographics, and Development Trends

The Town of Colchester was incorporated in 1698 when land was purchased by Nathaniel Foote from the Sachem of the Mohegan Native American Tribe. Mr. Foote's grandfather had emigrated from Colchester, England, in the early 17th century and Colchester, England was what a group of early English settlers envisioned America to become by laying out a new plantation in a large tract of untouched wilderness. Colchester grew from a church parish-centralized community in its beginnings to a mill community before it was industrialized and then suburbanized once the commercial cities of Middletown, Norwich and New London emerged. Today, it still maintains the suburban character with some commercial and industrial land use, while largely existing as a residential community. The housing stock in Colchester consists primarily of single family homes.

The suburban town is known for its principal industries of agriculture and manufacture of leather novelties, plastics, machine shops, and metal fabrication. Colchester also has a private airport called Skis Landing Area, which is generally used by small private planes and a heliport at the former Hub Ford, but is currently not utilized.

The 2015 Colchester Plan of Conservation & Development (POCD, effective 6/21/2015) calls for the Town to maintain and supplement the Land Acquisition Fund, to maintain the Open Space Advisory Committee, and to generally pursue acquisition and protection of additional open spaces.

The Colchester POCD also includes a future land use plan. The plan lays out a "Future Growth District" adjacent to and southeast of the Town Center between routes 11 and 16. Other development will be focused on re-use of already developed plots. The Route 11/Route 2 area continues to be the most important and immediate area of planned development in Colchester with water and sewer being extended into this area to promote development.

The Town has recently approved their first affordable housing complex. The project is currently underway and will include 24-units. There has also been new development occurring in the industrial park on Upton Road. In recent years there was larger development plans for the area south of Route 2. These plans have not come to fruition in the past decade; the Town is unsure if these developments will occur.

Overall, new development and redevelopment in Colchester is not increasing risks to natural hazards. Redevelopment throughout the community offers significant opportunities for flood mitigation to be incorporated into buildings and stormwater management to be addressed on-site; and new development is constructed per the flood damage prevention, wind loading, and snow loading requirements in the State Building Code.

As of the 2020 Decennial Census, the population for the town is 15,555, which equates to 317 people per square mile. The 2020 American Community Survey 5-year estimates identified the annual average median income for Colchester to be \$103,879, with an average of 52.3% of the population holding a Bachelor's Degree or higher, and an average unemployment rate of 4.7% throughout town.

2.5. Governmental Structure

Colchester is governed by a Town Meeting and Board of Selectmen form of government. The authority of town officials is granted by Connecticut General Statutes. The Town Meeting is the legislative body of the town and the Board of Selectmen is responsible for the administration of town policies. The First Selectman is the chief elected official and is responsible for the day-to-day administration of Colchester.

The Town of Colchester has boards, commissions, and committees that can take an active role in hazard mitigation, including the Conservation Commission (includes Wetlands), the Planning and Zoning Commission, the Police Commission, the Building Committee, the Open Space Advisory Committee, the Economic Development Commission, and the Board of Selectmen. Departments and commissions common to all municipalities in SCCOG were described in Section 2.9 of the Multi-Jurisdictional HMP. More specific information for the departments and commissions of the Town of Colchester is noted below:

- The Colchester Hayward Fire Department (CHFD) is a combination of career and volunteer fire fighters who protect lives and property from fire and hazardous incident damage and provides timely emergency medical services to the Town of Colchester and other neighboring municipalities.
- The Building Official is responsible for enforcing building, electrical, mechanical, plumbing, and energy code requirements to promote the safety for the people of Colchester by reviewing and administering the State of Connecticut Building Code.
- The Planning and Zoning Commission is the body that regulates land use and development in Colchester mainly through application of the Zoning Code.
- The Building Committee is charged with overseeing, coordinating and supervising all aspects of the planning and construction process, including selection of an architect and other consultants, choice of contractor, development of project documents and supervision of construction through completion and final acceptance by the Town on individual Town owned building projects.

- The Conservation Commissions responsibilities include the maintenance and update of the Town's Inland Wetlands and Watercourses Regulations, Wetlands Map and the Town's Open Space Plan.
- The Police Commission is a five-member Commission appointed by the Board of Selectmen which has the authority and responsibility for the general supervision and management of the police officers within Colchester and the property and equipment used.

The roles of Town departments have not changed since the time of the previous HMP. Thus, the Town of Colchester is technically, financially, and legally capable of implementing mitigation projects for hazards to the extent that funding is available.

2.6. Review of Existing Plans and Regulations

Colchester has different plans and regulations that recommend or create policies related to hazard mitigation. These policies and regulations are outlined in the Emergency Operations Plan, POCD (2015), Open Space Plan (2006), Zoning Regulations (2015), Subdivision Regulations (2010), Town Code (updated through 12/16/2021), and Inland Wetlands and Watercourse Regulations (2009). The Zoning Regulations were amended to January, 2015, and the floodplain regulations updated since the June 2011 edition. They incorporate NFIP requirements associated with the DFIRM available in 2011. Despite regular updates to the Town Code, its Flood Hazard Areas section has not been updated recently.

Emergency Operations Plan

The Town has an Emergency Operations Plan (EOP) that is updated and certified by the First Selectman annually. This document provides general procedures to be instituted by the First Selectman and/or designee in case of an emergency. Emergencies can include but are not limited to hazard events such as hurricanes and nor'easters. The EOP is directly related to providing emergency services prior to, during, and following a hazard event.

Plan of Conservation and Development (2015)

The POCD was most recently updated in 2015 with contributions from local boards, commissions, committees, citizens and citizen groups. The Plan seeks to be a statement of policies, goals and standards for the physical and economic development of the Town and recommends the most desirable uses types and population densities in various parts of the municipality. The 2015 Town of Colchester POCD includes the following actions and recommendations:

- Institute policies to protect natural resources, including floodplains, steep slope, water supply watersheds, vegetated buffers, National Diversity Database (NDDDB) areas, and other sensitive locations.
- Coordinate with open space organizations in surrounding towns and the region.
- Encourage Low Impact Development by narrowing road widths in new developments, eliminating curbing in some areas, and reducing parking requirements where feasible.
- Raise public awareness by educating residents and children on sustainability concepts.
- Continue to improve flood hazard mitigation plans for recurring events.
- Manage tree trimming to balance electrical system performance with rural character.
- Review and improve hazard mitigation plans for recurring events, such as flooding.

- Continue to review and improve emergency preparedness plans for non-recurring events.
- Design road connections and bypass roads around the town center to better accommodate traffic volumes and allow for better emergency response.
- Encourage water conservation, since much of the community relies on groundwater for domestic use.

The Colchester POCD is considered consistent with the current goals and actions of the Hazard Mitigation Plan. The next update to the POCD (scheduled for 2025, within the life of the current Hazard Mitigation Plan) will continue to incorporate the elements of the HMP.

Code of the Town of Colchester, Connecticut (Includes legislation adopted through 12/16/2021)

Chapter 64 of the Town Code includes "Flood Hazard Areas" which includes discussion of policies, permit requirements and application procedures related to land use and development in SFHAs within Colchester consistent with the NFIP. The document also states that the SFHAs are those areas designated from the Town and Borough of Colchester Flood Insurance Rate Maps (FIRM) and the Flood Boundary and Floodway Maps which are available in the office of the Town Clerk and with the Building Official for review.

Zoning Regulations (2015)

Section 9.3 of the Zoning Regulations, "Flood Hazard Overlay Districts," discusses SFHAs in Colchester. The regulations have been updated to be based on the July 18, 2011 FEMA Flood Insurance Study (FIS) and FIRM for New London County.

Subdivision Regulations (2010)

The Subdivision Regulations discuss the standards in the flood plain district in Section 6.6. Although regulations within the document include components of the current NFIP regulations, they are based on the FIRM dated July 15, 1992, and should be updated to the DFIRM mapping of July 18, 2011.

Inland Wetlands and Watercourses Regulations (2009)

The Inland Wetlands and Watercourses Regulations in the Town of Colchester require a permit for certain regulated activities that are within 75 feet or in a wetland or watercourse or that may impact a wetland or watercourse. These regulations build on the preventative flood mitigation provided by the Zoning Regulations by preventing fill and sedimentation that could lead to increased flood stages.

2.7. Critical Facilities, Sheltering Capacity, and Evacuation

Colchester considers several facilities to be critical to ensure that emergencies are addressed while day-to-day management of the town continues. Critical facilities are presented on figures throughout this annex and summarized in Table 2-2. No critical facilities are located within a SFHA. These facilities are described in more detail below.

Table 2-2 Town of Colchester Critical Facilities

Facility	Address or Location	Emergency Power	Shelter	Cooling Center	In SFHA
Emergency Services					
Colchester Hayward Fire Dept. Co. 1 & 2	52 Old Hartford Rd. / 424 Westchester Rd.	✓		✓	
Colchester Police Department	127 Norwich Avenue	✓			
Municipal					
Town Hall	127 Norwich Avenue	✓		✓	
Jack Jackter Intermediate School (EOC)	362 Halls Hill Road	✓	✓		
Bacon Academy	611 Norwich Avenue	✓	✓	✓	
Public Works Garage	300 Old Hartford Road	✓			
Cabin Road Wellfield WTP	140 Taintor Hill Road	✓			
Cabin Road Wellfield (Wells 3 and 5)	140 Taintor Hill Road	✓			✓
Judd Brook Wellfield (Well 4)	183 Lebanon Avenue	✓			✓
Elmwood Water Pump Station	550 Elmwood Heights	✓			
Highland Farm Water Tank	36 Highland Circle				
Prospect Hill Sewer P.S.	31 Prospect Hill	✓			
Cragin Memorial Library	8 Linwood Avenue			✓	
Nursing Homes, Senior Living and other Vulnerable Housing Developments					
Apple Rehab Center	36 Broadway Street	✓			
Colchester Commons Mobile Home Park	Lebanon Avenue				
Dublin Village	300 Lebanon Avenue				
Gan Aden	385 South Main Street				
Gan Aden Chestnut	28 Chestnut Hill Road				
Gan Aden Field	564 Norwich Avenue				
Gan Aden Too	564 Norwich Avenue				
Complete Care at Harrington Court	59 Harrington Court	✓			
Ponemah Village	283 Westchester Road				
Westchester Village Mobile Home Park	Shailor Hill Road				
Communications Infrastructure					
State Communication Tower	95 O'Connell Road	✓			
State Communication Tower	11 Munn Road (Windham Ave.)	✓			
Healthcare Facilities					
Hartford Healthcare Medical Group	163 Broadway Street				

The town anticipates the development of a new, larger senior center within the next one and half to two years (potentially 2024). The approved project will be located at the corner of Lebanon Avenue and Louis Lane, and will also be equipped with emergency power. The current senior is not a true community center of sorts, and it is the hope that this new building will play a more integral role in the community, therefore it should be identified as a near-future critical facility.

Shelters

The primary shelters for the town are the Bacon Academy and the Jack Jackter Intermediate School. The Intermediate School is also the EOC. In addition to these shelters, the town has identified four cooling centers that can be used during a heat wave or extreme heat event. These include the Bacon Academy, Colchester Hayward Fire Dept. Co. 1 & 2, Town Hall, and Cragin Memorial Library.

Communications

The Town includes the two state communication towers on 95 O'Connell Road and 11 Munn Road in its list of critical facilities. Additionally, the KX Dispatch (Connecticut State Police Troop K) is located in Colchester and links into dispatch services with other neighboring municipalities including Hebron, Salem, East Haddam, East Hampton, Haddam Neck, Marlborough, and Bozrah.

Colchester's communication with its residents, visitors, and businesses and its communications with outside emergency preparedness and response groups is adequate. The town employs the CT Alert "Everbridge" Emergency Notification System for Reverse 9-1-1 and encourages its residents to sign up for the service via the CT Alert Emergency Notification System web site (<http://www.ct.gov/ctalert/site/default.asp>).

During Tropical Storm Irene, communication with Connecticut Light & Power (CL&P) (now Eversource) was pursued by the Town, however CL&P's response was considered less than adequate. The outage following Tropical Storm Irene lasted seven to nine days in Colchester and trees blocked many roadways deeming both state and municipal roadways impassible and many wires were downed. Colchester sought to improve communication with CL&P moving forward in an effort to prevent a prolonged outage such as the one following Tropical Storm Irene. Eversource's Liaison Program was used in subsequent winter storms and other major storms to improve communication, as explained in Section 3.2.2.

Additional Municipal Facilities

The Public Works Garage houses the equipment, materials and staff needed to respond to natural hazard damage. The garage is located to the west of Town Center near Route 2 on Old Hartford Road.

The Town also considers its water and wastewater infrastructure to be critical facilities. Water and wastewater infrastructure includes Water Treatment Facility at 140 Taintor Hill Road, the Cabin Road Wellfield located adjacent to the treatment facility, the 31 Prospect Hill Road sewer pump station, the water booster station at 550 Elmwood Heights, the Highland Farm Water Tank at 36 Highland Circle, and Well No. 4 at 183 Lebanon Avenue. A new pumping station has been installed next to the Connecticut DOT garage since 2012. The town acquired the Colchester Senior Citizens Center from its private owner and operator in October of 2016. This is considered a critical facility.

Private Facilities

The town considers some types of private facilities within its list of critical facilities. This list consists of eight nursing homes / senior living facilities (two of which are now owned by the Town and so not a private facility) and two mobile home parks. Colchester Housing Authority has two locations (Dublin Village and Ponemah Village).

Evacuation Routes

Colchester's EOP describes the Town's evacuation plans. The Emergency Management Director is responsible for maintaining complete records and reports associated with tracking the status of evacuation events including evacuation notices, the number of persons evacuated and the number of evacuees in shelter/mass care centers. Additionally, the Emergency Management Director is responsible for maintaining up-to-date evacuation route maps that depict designated primary and alternate evacuation routes. The highest capacity egress routes from Colchester include:

- Route 2: oriented east-west; runs from Lebanon to Marlborough across the center of Colchester
- Route 16: oriented northeast-southwest; enters Colchester from Lebanon to the east, exits into East Hampton in the west
- Route 11: runs from Route 2 just south of the center of Colchester southerly to Salem
- Route 85: extends from the Salem town line northerly through the Town Center and continues north into Hebron

2.8. Repetitive Loss Properties

A repetitive loss property is defined as any insurable building that has had two or more claims exceeding \$1,000 that were paid by the National Flood Insurance Program (NFIP) within a ten-year period. Although there are flood insured properties in town, Colchester does not have any repetitive loss properties.

2.9. Exposure to Climate-Affected Natural Hazards

Properties, people, historic resources, and critical facilities in the Town are exposed to natural hazards affected by climate change (i.e., severe storms, coastal flooding, droughts) as well as hazards that are not affected by climate change (i.e., earthquakes). As an initial screening of exposure to hazards, areas of risk have been overlaid onto parcel and point data in a GIS to understand the maximum potential exposure to hazards. The results of this analysis are found in Table 2-3.

Table 2-3 Town of Colchester Exposure Analysis

Hazard	At-Risk Parcels		At-Risk Facilities		At-Risk Historic Assets	
	Value	Number	Value	Number	Value	Number
Hurricane/Tropical Storm	\$1,325,842,810	6,594	\$42,097,000	21	\$42,494,500	97

Severe Thunderstorm	\$1,325,842,810	6,594	\$42,097,000	21	\$42,494,500	97
Severe Winter Storm	\$1,325,842,810	6,594	\$42,097,000	21	\$42,494,500	97
Tornado	\$1,325,842,810	6,594	\$42,097,000	21	\$42,494,500	97
Drought	\$920,828,170	4,417	\$24,753,700	7	\$565,800	4
Flood						
1% Annual Chance	\$150,487,560	497	\$5,621,700	5	\$529,500	6
0.2% Annual Chance	\$151,367,260	502	\$5,621,700	5	\$529,500	6
Earthquakes	\$1,325,842,810	6,594	\$42,097,000	21	\$42,494,500	97
Wildfire	\$825,820,360	3,774	\$24,753,700	7	\$565,800	4

2.10. Community Climate Change Challenges

As is with all of the SCCOG communities, the Town of Colchester has several concerns regarding climate change challenges. Most communities in the region are typically most concerned with the impacts of increased flooding and extreme heat events, however, there are often concerns about other climate driven hazards. The following summary sheet identifies the top flooding, heat, and other climate change concerns for the town, along with the hazard mitigation and climate adaptation actions that will work to address these concerns.

Climate Change Summary Sheet for Town of Colchester

What are the Town's Top Climate Change Concerns?

Flooding: Road/stream crossings at undersized culverts remain a challenge throughout the town. Severe precipitation events can overwhelm structures at these crossings and damage roads.

Extreme Heat: The Town has increasing concerns about the effects of extreme heat events on chicken and other agricultural and livestock operations. Avian flu and other health-related cascading impacts of extreme heat events.

Others: The Town wishes to address remaining needs related to critical facilities that are needed to help address impacts of climate change.

Which Hazard Mitigation and Climate Adaptation Actions Will Address Climate Change Concerns?

Flooding: Complete a drainage/flooding master plan for the town that prioritizes the stream crossings with the most needs. Use the master plan to pursue grants to upgrade culverts and bridge capacities.

Extreme Heat: Partner with chicken farms and other facilities to develop reliable, drought-resilience water supplies and standby power that is capable of operating cooling equipment.

Others: Ensure that the new Senior Center includes cooling center capabilities and the appropriate resources needed for use such as standby power; and secure reliable transportation options for people to access cooling centers.

3. Extreme and Severe Storms

3.1. Climate Change Impacts

Climate change projections indicate varying changes in the frequency and intensity of severe storms and their relative hazards like precipitation and wind. It is expected that as global mean temperatures continue to rise, storms like hurricanes, tropical storms, and severe thunderstorms, may become more frequent and more intense. The degree to which these events might change, and the confidence levels in the models, vary by event type.

Hurricanes and tropical storms are likely to be accompanied by higher wind speeds and an overall increase in intensity. Warm water and air temperatures are essentially the fuel source for the storm, therefore warmer temperatures mean an increase in fuel which can produce more intense winds and high precipitation levels.

While the future behavior of tornado and high wind events is a little more challenging to predict in comparison to hurricanes, it has been noted that the number of days of tornadic activity has decreased in recent decades, though the number of tornadoes in a single day has increased.¹ There is a similar lack in confidence when projecting severe thunderstorm and wind events. Because these events are short-lived and relatively small-scale, monitoring and modeling are more challenging. Overall, however, future climate conditions are likely to become more conducive to the development of such events, therefore increasing the potential for occurrence.

Severe winter storm events, similar to hurricanes, are expected to become more intense under future climate conditions, however they are expected to become less frequent. These storms will continue to be capable of producing large amounts of precipitation, though in future decades this precipitation will consist of less snow and more wintry mix or rain.

These changes in storms could equate to an increase in risk throughout town or for specific populations, more severe storm damages and impacts, or an increase in flooding occurrences.

3.2. Hurricanes and Tropical Storms

3.2.1 Setting and Recent Occurrences

Several types of hazards may be associated with tropical storms and hurricanes including heavy or tornado winds, heavy rains, and flooding. Flooding hazards are discussed in Section 5.2 of this annex. Wind hazards are widespread and can affect any part of the town. However, some buildings in the town are more susceptible to wind damage than others.

Tropical Storm Irene impacted the town in August 2011. Sections of trees fell throughout the town and the region causing power outages lasted up to seven to nine days in Colchester. The Town learned that communication between the Town and its power utility at the time, Connecticut Light & Power (CL&P), needed to greatly improve in order to efficiently and effectively clear roadways throughout town in the future.

¹ <https://nca2018.globalchange.gov/chapter/2/>

In 2012, Super Storm Sandy, a hybrid storm with both tropical and extra-tropical characteristics, brought high winds and coastal flooding to southern New England. Record breaking high tides and wave action was combined with sustained winds of 40 to 60 mph and wind gusts of 80 to 90 mph. Emergency managers recommended mandatory evacuations of 362,000 people that lived in low lying areas. Widespread significant statewide power outages of 667,598 lasted up to 8 days. The town of Colchester received over \$120,000 in disaster relief from FEMA to cover the cost of damages from the storm. The storm cost the Town \$96,976 in contractor labor and forced labor. Town personnel reported that trees and power lines were downed across Town.

On August 2, 2020 Tropical Storm Isaias swept through the State bringing severe winds which resulted in the highest number of outage events Connecticut has ever experienced. With over 620,000 outages reported by Eversource alone, the state's largest electric supplier, residents across the SCCOG region were without power, cable, and internet for extended periods of time. While this storm did not generate typical amounts of rainfall experienced during a tropical storm event, the wind damage exceeded expectations bringing down trees and power lines across the state.

In 2021, there were four tropical storm events that passed through, or within 50 miles of, the state. Some of these events, which are described in more detail below, resulted in flooding along several brooks and stream crossings, including roadway washouts. During Hurricane Ida, the Town reported that the areas that "are known to flood" did so during this heavy precipitation tropical event. Power outages during these events, and other severe storms, were still a challenge for the town.

The 2021 events included Elsa, Fred, Henri, and Ida.

- July 9, 2021 (T.S. Elsa) – Elsa made landfall as a tropical storm in Florida and traveled along the eastern seaboard. It passed through Southeastern New England bringing high winds and rainfall. Gusts were reported over 40 mph, and residents throughout the region and state were left without power.
- August 19, 2021 (Extratropical Storm Fred) – This tropical event passed north of the state bringing heavy rain to some areas in Connecticut; there was a reported 5.14 inches in West Hartford. Fred also produced an EF-0 tornado in Windham County.
- August 22, 2021 (T.D. Henri) – Hurricane Henri made landfall in Rhode Island as a tropical storm and then traveled northwest across the State of Connecticut. While the impacts for Henri were projected to be more severe than they actually were, the storm did result in heavy rainfall and thousands of power outages.
- September 1, 2021 (Extratropical Storm Ida) – Though Hurricane Ida made landfall in Louisiana as a category 1, the storm moved south of Long Island as an extratropical storm and is reported to be costliest storm even since Hurricane Sandy a decade earlier. Ida caused major flooding across Connecticut and the Southeastern Region. For the first time, a statewide flash flood warning was issued. Several communities in the state, including the City of Norwich, warned residents to have minimal contact with surface waters due to the discharge of untreated sewage. There were reports of 7 to 8 inches of rainfall in the Southeastern Region, and as high as 8.58 inches in Uncasville.

3.2.2 Existing Capabilities

Wind Loading

Wind loading requirements for new buildings are addressed through the Connecticut Building Code which is utilized by the town. Effective October 1, 2016, the ultimate design wind speed for Colchester ranges from 120 to 140 miles per hour depending on the building use (for example, hospitals must be designed to the higher wind speed). Wind loading requirements are addressed through the state building code. The Connecticut State Building Code was most recently adopted with an effective date of October 1, 2016. The code specifies the design wind speed for construction in all the Connecticut municipalities. The ultimate design wind speed for Colchester ranges from 120 to 140 miles per hour depending on the building use (for example, hospitals must be designed to the higher wind speed). Note that changes in design wind speed figures since the previous HMP are largely the result of a shift from "nominal" to "ultimate" wind speeds, for compatibility purposes; see the Connecticut Building Code or the American Society of Civil Engineers website for more information. Colchester has adopted the Connecticut Building Code as its building code.

Tree Maintenance and Removal

Parts of trees (limbs) or entire tall and older trees may fall during heavy wind events, potentially damaging structures, utility lines, and vehicles. Utility lines are placed underground in new developments; however most electrical lines have historically been installed above ground. Some streetscaping of Lebanon Avenue included the use of solar lighting as opposed to traditional electrical lines.

The Tree Warden and Colchester Department of Public Works (DPW) currently have a tree maintenance budget of \$15,000. This is slightly less than the reported \$18,000 from the previous plan. The town has in recent years continued to make progress removing hazardous trees, however, funding has slowed the process. The town continues to seek funding opportunities for tree maintenance, and increases the maintenance budget when feasible to increase capacity. The DPW also replaced its old wood-chipper with a new one that has a higher capacity, which will help respond to debris-creating events. The Tree Warden contracts with local tree companies when the Town's maintenance and response capacities are exceeded. This pivot to focusing on local companies, rather than larger regional or national companies, reduces waiting time and improves communication and coordination.

Power Utility Coordination

The Tree Warden coordinates tree removal and maintenance with the local power utility. In response to the major power outages caused by Tropical Storm Irene and Hurricane Sandy, as well as significant winter storm events, Eversource has taken an aggressive approach to tree maintenance and has improved communication and coordination with municipalities. Colchester personnel report that Eversource has enhanced its tree clearing efforts, has updated its facilities, and has been working to strengthen the power grid and build in redundancies. They also report that they plan to remove one substation from service while doubling capacity at another site.

Town personnel believe that communication with the company, thanks to Eversource's liaison program, has been consistent and helpful. While staff report Eversource's response to storm events has improved

significantly from CL&P's historic response capabilities,, they feel that capacity is still limited. For example, the Town has to wait for and Eversource "make-safe" crew to arrive to address downed wires before the Town is able to perform any response activities; this may take a long time, possibly because Eversource does not have enough personnel.

The Town enforces a requirement that utilities be located underground in new developments.

Debris Management

The Town's transfer station accepts brush, tree trunks, limbs, and leaves and typically sees an increase in collections following wind storms; in a major debris-generation event, the Ruby Cohen Fields may be used as a backup debris storage space. This material is reused within Colchester whenever possible. The Town also has agreements with companies to chop/chip following heavy wind events in order to ensure that cleanup occurs as efficiently as possible.

Warning and Communication

Warning is one of the best ways to prevent damage from hurricanes and tropical storms, as these storms often are tracked well in advance of reaching Connecticut. The town can access National Weather Service (NWS) forecasts via the internet as well as listening to local media outlets (television, radio) to receive information about the relative strength of the approaching storm. This information provides the resources needed to determine whether or not to activate its EOP and encourage residents to take protective or evacuation measures if appropriate.

In addition, Colchester subscribes to the statewide CT Alert "Everbridge" Reverse 9-1-1 Emergency Notification System which provides residents the ability to register to receive warnings, critical information and area specific alerts.

There are also several siren boxes located throughout the town which are part of the Connecticut Yankee early warning system. While not all are still operable, there are still some active sirens that can be operated directly from the EOC during an event. Those still in service are tested every six months. The maintenance and upkeep of this system has been a challenge, though the town does realize the role this system can play during a warning, and is therefore continuously looking for funding opportunities to maintain and repair the system.

Critical Facilities and Shelters

All of Colchester's critical emergency service, municipal, communications, wastewater, and water distribution facilities (including wastewater pumping stations and drinking water wellfields) are outfitted with emergency power. Additionally, many private properties have acquired backup power generators in recent years. None of the gas stations (privately-owned) in Town have emergency power. This has caused difficulties in the past when fuel is unavailable during a town-wide outage. The Town is interested in finding a way to address this issue.

Although hurricanes that have impacted Colchester have historically passed in a day's time, additional regional shelters could be outfitted following a storm with the assistance of the American Red Cross on an as-needed basis for long-term evacuees.

Summary

Colchester's hurricane-mitigation capabilities are centered its tree-limb maintenance program and coordination with the power utility.

Policies relevant to hurricane mitigation include:

- Implementation of the most up-to-date edition of the Connecticut State Building Code
- Burial of utility lines in new development
- Support of an adequate tree maintenance budget
- Utilization of designated debris storage sites after events
- Maintenance of trees alongside public roads and in public spaces is the responsibility of the appointed Tree Warden
- Maintenance of trees on private property is the responsibility of the landowner

Relevant programs include:

- A roadside tree maintenance and removal program run by the DPW under the supervision of the Tree Warden
- A program to note and encourage residents to cut dangerous trees on their properties
- Active coordination with Eversource

An additional capability that has improved since the previous HMP edition is the number and distribution of both municipal and privately-owned power generators.

Overall, Town officials feel their wind-event preparation and response capabilities, including tree maintenance, debris removal, utility coordination, and communication, have improved since the previous edition of this HMP. Nevertheless, the Town would like to continue to work on improving its tree maintenance program. It is also interested in addressing the lack of emergency power available to gas stations in Town, and the loss of access to fuel during power outages.

3.2.3 Vulnerabilities and Risk Assessment

The entire town is vulnerable to hurricane and tropical storm wind damage and from any tornadoes (Section 3.3) accompanying the storm, as well as inland flooding (Section 5.2). Of particular concern are the blockage of roads and the damage to the electrical power supply from falling trees and tree limbs. There was a town-wide seven to nine day power outage due to tree damage to utility lines following Tropical Storm Irene in 2011, and widespread power outages after Hurricane Sandy in 2012.

A majority of structures built in town do not meet current building codes and are particularly susceptible to roof and window damage from high wind events. This risk to structures will be reduced with time as these buildings are remodeled or replaced with buildings that meet current codes. Those newer structures put in place since the 1990s are less vulnerable to damage from hurricanes and/or tropical storms. Colchester municipal staff note that many Town-owned buildings have been constructed in the last 40 years (since the 1970s), were built to code at the time, and are expected to be wind resistant. Older Town-owned buildings have withstood significant wind events and, therefore, are also expected to be wind resistant. Concern over wind damage to Town-owned buildings is therefore fairly low.

Town personnel are concerned about the vulnerability of gas stations in Town. As noted previously, none of these businesses have emergency power generators; consequently, fuel can be difficult to obtain during a power outage.

The town is also particularly concerned about residents who need emergency care or oxygen. During a hurricane or severe storm event, these residents be at risk if there is an outage, or access and egress issue. However, the fire department patrols these neighborhoods and the EOC is prepared during an event to take any calls for assistance, and in the event of an emergency, the town can transport these residents to a shelter or hospital if necessary.

The strength of a large hurricane could cause a moderate economic impact to the town. The potential economic effect of wind damage to SCCCOC was evaluated in the Multi-Jurisdictional HMCAP. A separate analysis was not performed specifically for Colchester.

3.2.3.1 Hazard Losses

The Town of Colchester received \$94,251 in FEMA Public Assistance (PA) funds in the wake of Hurricane Isaias. These funds are the federal share of the eligible costs associated with the hurricane, which were a total of \$104,724. A majority of the funds were received for debris removal, with the remainder for protective measures (Figure 3-1). Since 2012, the town has received \$216,155 in FEMA PA funds (including Isaias) for project costs of \$267,262.

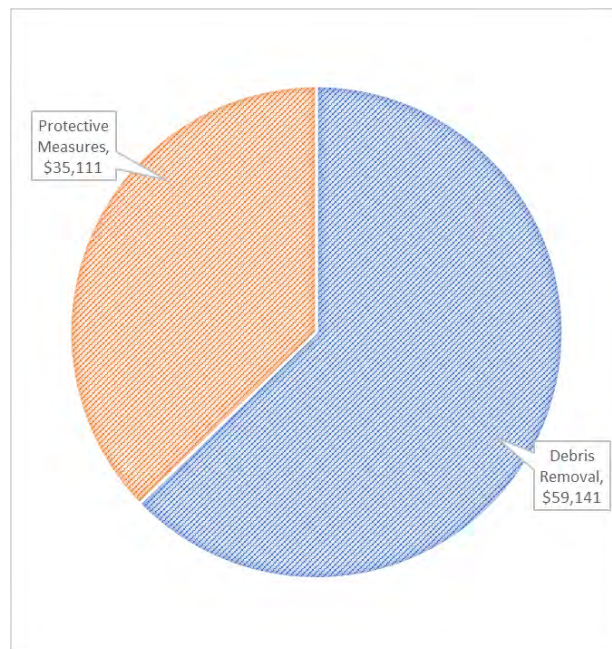


Figure 3-1 Hurricane Isaias Funding Categories

FEMA HAZUS-MH 6.0 was used to develop losses associated with seven probabilistic hurricane scenarios from the 10 year to 1,000 year return period. Losses include economic loss, building damages, debris, and sheltering needs. Table 3-1 through Table 3-3 through presents hurricane related damages for the Town of Colchester. Additional HAZUS-generated losses for the town and region can be found in the Multi-Jurisdictional document.

Downscaled tropical storm losses based on the 2019 Connecticut Natural Hazard Mitigation Plan are developed in the Multi-Jurisdictional document.

Table 3-1 HAZUS-MH Hurricane Related Economic Impacts

Colchester	Return Period	Residential	Commercial	Industrial	Others	Total
	10-year	\$83,820	\$0	\$0	\$0	\$83,820
	20-year	\$1,521,200	\$61,290	\$14,540	\$21,850	\$1,618,880

	50-year	\$11,078,280	\$746,380	\$154,430	\$180,430	\$12,159,520
	100-year	\$22,386,580	\$2,565,760	\$619,530	\$872,440	\$26,444,310
	200-year	\$41,436,940	\$5,669,440	\$1,807,820	\$2,174,900	\$51,089,100
	500-year	\$80,358,150	\$14,875,660	\$4,408,550	\$5,510,120	\$105,152,480
	1,000-year	\$120,316,800	\$23,013,630	\$7,084,240	\$7,917,760	\$158,332,430

Table 3-2 HAZUS-MH Hurricane Related Building Damage

Colchester	Return Period	Minor	Moderate	Severe	Destruction	Total
	10-year	3	0	0	0	3
	20-year	12	1	0	0	13
	50-year	185	16	1	0	202
	100-year	499	61	3	0	563
	200-year	904	157	11	4	1,076
	500-year	1,387	356	42	15	1,800
	1,000-year	1,652	523	79	32	2,286

Table 3-3 HAZUS-MH Hurricane Related Debris and Sheltering Needs

Colchester	Return Period	Debris Generated (Tons)	Households Displaced	Individuals Seeking Temporary Shelter
	10-year	12	0	0
	20-year	188	0	0
	50-year	2,567	0	0
	100-year	4,344	0	0
	200-year	7,232	2	0
	500-year	13,569	26	5
	1,000-year	18,802	53	12

3.3. Tornadoes and High Wind Events

3.3.1 Setting and Recent Occurrences

Similar to hurricanes and winter storms, wind damage associated with severe thunder or summer storms and tornadoes has the potential to affect any area of Colchester. Furthermore, because these types of storms and the hazards that result (flash flooding, wind, hail, and lightning) might have limited geographic extent, it is possible for a severe storm to harm one area within the town without harming another. Such storms occur in the town each year, although hail and direct lightning strikes to the town are rarer. No tornadoes have occurred in the town since the last HMP.

Several severe storms have impacted the region since the last HMP, some of which have caused significant damage. Notable events include:

- On June 18, 2012 a stalled front in the vicinity coupled with a passing upper level disturbance produced an isolated severe thunderstorm in New London County. Wires were reported down on Route 85.
- On June 23, 2015 a passing cold front triggered multiple severe thunderstorms across the entirety of Southern Connecticut. Numerous trees and wires were reported down throughout Colchester.
- On September 6, 2017 a cold front triggered severe storms in county and caused tree damage in multiple communities in the region. Colchester reported trees and wires down, and the Groton-New London Airport measured sustained winds at 44 mph and gusts of 56 mph.
- On April 13, 2020 a low pressure system resulted in high winds throughout New London County.
- On November 13, 2021 a tornado touched down in the Pawcatuck section of Stonington, and another further north in Plainfield. There were reports of uplifted trampolines, downed trees and powerlines, and an uplifted metal shed. This same storm also caused damage in other surrounding communities.

3.3.2 Existing Capabilities

Warning is the most viable and therefore the primary method of existing mitigation for tornadoes and thunderstorm-related hazards. The NOAA National Weather Service issues watches and warnings when severe weather is likely to develop or has developed, respectively. The town can access NWS forecasts via the internet as well as listen to local media outlets (television, radio) to receive information about the relative strength of the approaching storm. This information allows the town to activate its EOP and encourage residents to take protective measures if appropriate.

Aside from warnings, additional methods of mitigation for wind damage are employed by the town as explained in Section 3.2.2 within the context of hurricanes and tropical storms. In addition, the Connecticut Building Code includes guidelines for the proper grounding of buildings and electrical boxes to protect against lightning damage.

Summary

Programs and policies of Colchester related to summer storm and tornado mitigation include monitoring of severe weather conditions by the Town Emergency Management Director, communication with the public about impending storm events, and enforcement of the most up-to-date edition of the

Connecticut Building Code. Other programs and policies relevant to high wind hazards are summarized in section 3.3.2. In general, municipal capabilities to mitigate thunderstorm and tornado damage have not increased significantly since the 2012 edition of the hazard mitigation plan was adopted.

3.3.3 Vulnerabilities and Risk Assessment

Summer storms are expected to occur each year and are expected to at times produce heavy winds, heavy rainfall, lightning, and hail. All areas of the town are equally likely to experience the effects of these storms. The density of damage is expected to be greater near the more densely populated area of the town.

Most thunderstorm damage is caused by straight-line winds exceeding 100 miles per hour (mph). Experience has generally shown that wind in excess of 50 mph will cause significant tree damage during the summer season as the effects of wind on trees is exacerbated when the trees are in full leaf. The damage to buildings and overhead utilities due to downed trees has historically been the biggest problem associated with wind storms. Heavy winds can take down trees near power lines, leading to the start and spread of fires. Such fires can be extremely dangerous during the summer months during dry and drought conditions. Fortunately, most fires are quickly extinguished due to the town's strong fire response and coordination with Connecticut DEEP fire fighters.

Lightning and hail are generally associated with severe thunderstorms and can produce damaging effects. All areas of the town are equally susceptible to damage from lightning and hail, although lightning damage is typically mitigated by warnings and proper grounding of buildings and equipment. Hail is primarily mitigated by warning, although vehicles and watercraft can often not be secured prior to the relatively sudden onset of a hailstorm. Lightning and hail are considered likely events each year, but typically cause limited damage in the town. Older buildings are most susceptible to lightning and hail damage since many were constructed prior to current building codes, and many campgrounds offer little structural protection from the elements.

Although tornadoes pose a threat to all areas of Connecticut, their occurrence is less frequent in New London County as compared with the rest of the Connecticut. Thus, while the possibility of a tornado striking the town exists, it is considered to be an event with a very low probability of occurrence.

3.3.3.1 Hazard Losses

In the wake of the 2018 severe storm and flooding event, FEMA DR-4410, the town did receive funds, however they were received for flooding associated with the storm. These figures can be found in section 5.3.3.1.

The NOAA National Centers for Environmental Information (NCEI) did have a report of one-inch hail on Halls Hill Road on June 29, 2020. There were however no reported damage figures associated with this event.

Downscaled losses based on the 2019 Connecticut Natural Hazard Mitigation Plan are developed in the Multi-Jurisdictional document.

3.4. Severe Winter Storms

3.4.1 Setting and Recent Occurrences

Similar to hurricanes and summer storms, winter storms have the potential to affect any area of the town. However, unlike summer storms, winter storms and the hazards that result (wind, snow, and ice) have more widespread geographic extent. In general, winter storms are considered highly likely to occur each year (major storms are less frequent), and the hazards that result (nor'easter winds, snow, and blizzard conditions) can potentially have a significant effect over a large area of the town.

The winter storms of 2010-2011 had a significant effect on the town. The privately-owned Butler Building (which houses construction equipment) in town collapsed during the 2010-2011 winter, and a total of 12 homes were in danger with severe deflection and cracked sheetrock. All town-owned buildings were evaluated and critical roof areas were cleared. The town assisted some residents in clearing roofs with ladder trucks.

Winter Storm Alfred in October 2011 caused tree damage because Colchester received seven inches of wet, heavy snow. Even though the town experienced severe damage following Tropical Storm Irene just months before, some outages lasted five days in Colchester following Alfred. CL&P took harsh criticism in the wake of the storm due to poor communication with municipalities.

The year 2013 featured exceptional snow events that severely taxed snow removal abilities of towns in the region. The blizzard of 2013 in early February dumped one to two feet of snow on the region. Another snowstorm struck the region in mid-March, 2013 dumping upwards of one to two feet of snow in some parts of the county. Colchester received nearly \$90,000 in federal aid from FEMA to help cover storm cleanup costs; the Town reports \$105,000 in contractor and forced labor costs.

The 2015 winter also saw a number of significant snow events in Town. Two major snow events in particular dropped over 18 inches of snow across the region and closed roads. Over the course of the winter season Colchester spent approximately \$104,000 on contractor and forced labor costs of the response.

A heavy storm came through the region on February 9, 2017 bringing blizzard conditions and heavy snowfall. Colchester reported 14.5 inches of snow, and 13 inches were reported along the coast in Groton.

A late winter storm on March 12, 2018 resulted in 23 inches of snowfall in Oakdale, with reports of one to two feet in other parts of Northern New London County. The southern part of the region experienced 10 to 18 inches of snow, and strong wind gusts. There were also reports of downed trees throughout the region as a result of this storm.

On January 28, 2022 the region was hit with a heavy snowstorm and blizzard like conditions. Parts of the region reported up to 22 inches of snowfall, and gusts up to 65 mph. There were also several hours of less than ¼ mile visibility. Snow drifts were also reported to be a challenge, with some areas experiencing drifts up to three and a half feet deep.

3.4.2 Existing Capabilities

Existing programs applicable to winter storm winds are the same as those discussed in Sections 3.2.2 and 3.3.2. Programs that are specific to winter storms are generally those related to preparing plows and sand and salt trucks; tree trimming and maintenance to protect power lines, roads, and structures; and other associated snow removal and response preparations.

As it is almost guaranteed that winter storms will occur annually in Connecticut, it is important to locally budget fiscal resources toward snow management. Snow is the most common natural hazard requiring additional overtime effort from town staff, as parking lots and roadways need constant maintenance during storms. Colchester has instituted a snow-budget reserve system, such that when the snow maintenance budget for a particular fiscal year is not used, the excess is put into a reserve fund that can only be used for future snow removal activities. This helps ensure that fluctuations in the severity of winter snow seasons will not inadvertently lead to underfunding of snow maintenance activities.

The Public Works Department oversees snow removal in the town through deployment of 10 town trucks and four contracted trucks. The crew operates on 14 snow plowing routes. The Connecticut Department of Transportation (DOT) plows the State roadways, while the town prioritizes routes by steepness, proximity to major facilities such as schools and other factors. A high priority is given to school bus routes that include steep hills. Salt is used for deicing in Colchester. Colchester's "Snow and Ice Control Plan" (revised to 11/05/2009) is available to the public through the Town's website (on the Highway Department page). This increases transparency and allows residents to understand how winter maintenance decisions are made.

The Connecticut Building Code specifies that a pressure of 30 pounds per square foot be used as the base "ground snow load" for computing snow loading for roofs. The town monitors and shovels the roofs of municipal buildings when snow loads accumulate, and many residents and businesses shovel or plow their roofs. When necessary, the Town has a procedure to procure volunteers to assist with snow clearing from roofs. The Town does not have a written prioritization for roof clearing activities, and does not think such a document would improve their capability. Colchester schools have their own roof-clearing protocols; the load capacities of these roofs have been calculated, and the schools administrations oversee monitoring. Summary Colchester's winter storm mitigation and response capabilities have improved sharply since the previous edition of the HMP.

Colchester's relevant policies include:

- The DPW is primarily responsible for snow removal using its own trucks and heavy equipment
- Private companies are contracted to assist the DPW as necessary
- Clearing of State, Town, and private roads are the responsibility of the State, Town, and private communities, respectively
- The "Snow and Ice Control Plan" is posted to the Town website to improve public communication
- Schools are responsible for monitoring and clearing of their roofs

Relevant programs include:

- A "snow reserve" ensures the Town has sufficient funds to operate throughout more costly snow seasons
- A proven and robust municipal building roof monitoring and clearing program, with volunteer help as needed

Colchester's winter storm mitigation capabilities, and improvements to those capabilities, also address hazards related to falling tree limbs, power outages, and flooding. These have been addressed in sections 3.2.2 and 5.2.

3.4.3 Vulnerabilities and Risk Assessment

Severe winter storms can produce an array of hazardous weather conditions, including heavy snow, microclimates, blizzards, freezing rain and ice pellets, flooding, heavy winds, and extreme cold. Further "flood" damage could be caused by flooding from frozen water pipes. Often, tree limbs on roadways are not suited to withstand high wind and snow or ice loads.

Warning and education can prevent most injuries from winter storms. Most deaths from winter storms are indirectly related to the storm, such as from traffic accidents on icy roads and hypothermia from prolonged exposure to cold. Damage to trees and tree limbs and the resultant downing of utility cables are a common effect of these types of events. Secondary effects can include loss of power and heat.

As a result of a significant change in elevation in town with elevations ranging from approximately 650 feet along Bush Rock Road to approximately 75 feet along the Salmon River, there are many steep slopes and sometimes significant differences in snowfall totals dependent on elevation. This presents the possible situation of wintry weather impacting the highest elevations while the lowest elevations are not impacted.

In general, there are few steep slopes that require extra salting of the roadways in necessary locations to alleviate trouble spots. Town officials did not indicate this to be a major mitigation issue but rather an issue that deserves priority when town staff begins their treatment of roads. These areas are usually treated first by town staff during and following winter storms.

3.4.3.1 Hazard Losses

There have been no reported losses from NOAA or FEMA for the Town of Colchester since 2017 for severe winter storms. In the past decade however, the Town had received \$159,618 in FEMA PA funds for winter storms. Downscaled losses based on the 2019 Connecticut Natural Hazard Mitigation Plan are developed in the Multi-Jurisdictional document.

4. Sea Level Rise

4.1. Climate Change Impacts

Sea levels are rising at an increased rate across the globe. These rising waters are attributed to melting glaciers and ice sheets, as well as thermal expansion from warming ocean waters. Global sea level rise takes into account the major causes of rise, and the averages of rise around the world. Local sea level rise estimates consider the global changes, in addition to what is happening more locally such as changes in currents or land subsidence.

The University of Connecticut, Connecticut Institute for Resilience and Climate Adaptation (CIRCA) has, in accordance with state statute, developed local sea level rise projections for communities to use as a planning threshold (Figure 4-1). CIRCA recommends that communities plan for 0.5 meter (1.64 feet) of sea level rise above 2001 levels by 2050. CIRCA intends to revisit this estimate and update the planning thresholds in the lifespan of this plan (2023-2028).

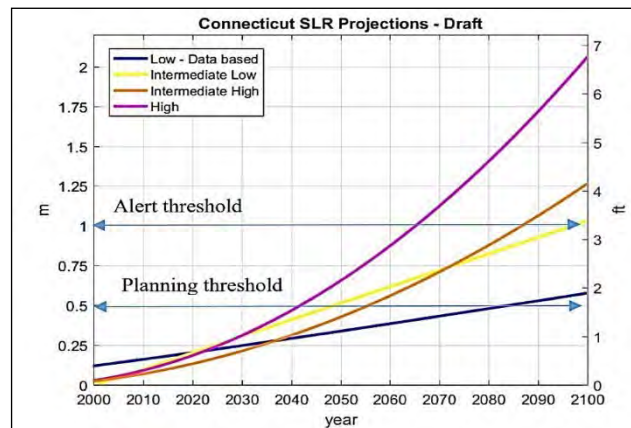


Figure 4-1 Four Localized Sea Level Rise Scenarios for

Even though sea level rise occurs over a longer time period than other hazards, coastal communities are becoming increasingly concerned with the cascading impacts. Increased sea levels can also cause a greater geographic reach for coastal flooding events, an increase in frequency or extent of “sunny day” flooding, an increase in storm surge extent, and saltwater inundation along the shoreline. All of these impacts can damage properties, deteriorate infrastructure, cause access and egress challenges, and exacerbate coastal erosion processes.

4.2. Coastal Flooding

4.2.1 Setting and Recent Occurrences

Colchester is not located along the coastline nor is it located in a potential hurricane surge zone. As such, no coastal flooding or storm surge has affected the town since the last HMP. Therefore, the town is not considered to be affected by coastal flooding and storm surge

4.2.2 Existing Capabilities

Due to the town not being on the coast, it does not have and/or need regulations to restrict development due to coastal flooding hazards.

4.2.3 Vulnerabilities and Risk Assessment

No areas of the town are vulnerable to coastal flooding or storm surge.

4.2.3.1 Hazard Losses

There are no reported losses for the Town of Colchester related to coastal flooding.

4.3. Shoreline Change

4.3.1 Setting and Recent Occurrences

Colchester is not located along the coastline, as such, no coastal erosion has impacted the town since the last HMP. Therefore, the town is not considered to be affected by coastal flooding and storm surge

4.3.2 Existing Capabilities

Due to the town not being on the coast, it does not have and/or need regulations to restrict development due to coastal flooding hazards.

4.3.3 Vulnerabilities and Risk Assessment

No areas of the town are vulnerable to coastal flooding or storm surge.

4.3.3.1 *Hazard Losses*

There are no reported losses for the Town of Colchester related to shoreline change.

5. Changing Precipitation

5.1. Climate Change Impacts

Across the United States, annual precipitation has increased in the past century, however, this change *is* dependent upon the region. Here in the northeast, precipitation totals and intensity are believed to have increased, and are projected to continue to increase during spring and winter months. However, climate change has also been linked to a reduction in snow cover extent, and an earlier spring melt. Winter precipitation may also change from snow to a wintry mix or rainfall due to warmer temperatures; so, while precipitation may increase it may not necessarily be an increase in snow.

Changes in precipitation can also shift the frequency and severity of droughts. As the climate warms, surface soil moisture is likely to decrease as evaporation rates rise. This decrease in soil moisture, and potentially longer periods of time between intense precipitation events, could potentially mean longer and stronger droughts.

These changes in precipitation can have various types of impacts. With an increase in intense precipitation, flooding events may become more frequent, damages to crops may occur, and spring flood trends may shift with less snow and more rain. Droughts on the other hand can also cause damage to crops, stress livestock and agricultural operations, and also reduce drinking water supplies or private wells.

5.2. Riverine and Pluvial Floods

5.2.1 Setting and Recent Occurrences

Flooding is the primary hazard that impacts the town each year as documented in the previous edition of this plan. While riverine flooding along watercourses is of primary concern, shallow nuisance flooding and poor drainage have also caused flooding at some locations in the town. Flooding is typically caused by heavy rainstorms, but can also be caused by relatively light rains falling on frozen ground. Flooding of roadways is more common than damage to structures in the Town of Colchester.

The March 2010 storms continue to be considered the event that caused the most widespread flooding in Colchester since the town began participating in the multi-jurisdiction hazard mitigation plan, causing basement flooding, roadway flooding, and nuisance flooding. However, the areas impacted by the March 2010 storms are not typically impacted by floodwaters. Following the basement flooding of March 2010, the Town submitted reimbursement requests to FEMA, but was not reimbursed. At a December 2016 meeting, Town personnel noted that even during the major 2010 floods, no structural damage was observed to buildings in Town.

The region has, however, seen some severe rainstorm events since the 2017 plan, with many neighboring communities having experienced serious flooding as a result.

The September 2018 rain event caused severe flooding throughout the state, with several communities in the SCCOG region receiving FEMA funding for the event. Neighboring Norwich received 4.85 inches of rainfall and Lebanon had a reported 6.79 inches.

Hurricane Ida, which produced several inches of rain across the state, caused flooding in many SCCOG communities. Norwich Public Utilities recorded 6.34 inches of rainfall and Groton-New London Airport recorded 2.05 inches.

The Town reported that areas that are known to typically flood did so during hurricane Ida; these floods were no surprise. In addition, during 2021, the Town reported flooding at several stream crossings and culverts, some of which resulted in road washouts. These are discussed in more detail in section 5.2.3.

After the severe flashy drought of summer 2022, a severe rainstorm event on September 5-6, 2022, caused flooding throughout southeastern Connecticut. Lebanon experienced road closures and washouts, while Norwich Public Utilities observed 5.85 inches of rainfall. There were flood and flash flood warnings throughout the region and across the state. Neighboring Rhode Island reported 11 inches of rainfall in some communities.

5.2.2 Existing Capabilities

The town attempts to mitigate inland flood damage and flood hazards by utilizing a wide range of measures including restricting activities in areas of flood risk, placing riprap in locations currently experiencing bridge scour, promoting flood insurance, maintaining drainage systems, advancing education and outreach, and by utilizing the reverse 9-1-1 warning system. Many mitigation measures are common to all hazards and therefore are listed in Section 0. No structural flood control projects are located within or upstream of Colchester, although some existing dams provide a small amount of flood mitigation.

Bridge Replacements, Drainage, and Maintenance

The Department of Public Works cleans and inspects catch basins and culverts at least annually or more often if problems are noted. When flooding occurs, the Public Works Director or either Fire Company typically handles complaints from residents. For example, the Public Works department would inspect bridges and culverts and erect barricades to close roads, while the Fire Companies respond to calls requesting help for flooded basements. Drainage complaints are directed to the Public Works Director.

Bridge and culvert upgrades have occurred since the previous edition of this HMP:

- Sections of Caverly Mill Road have been elevated, and the bridge has been replaced and elevated
- Harbor Road culverts were repaired with rip rap after a washout

In addition, scour protection measures have been installed at the Paper Mill Road Bridge. This action has reduced the risk of erosion and undermining of this bridge.

Regulations, Codes, and Ordinances

Colchester has planning and zoning tools in place that incorporate floodplain management. These meet, and sometimes exceed, baseline NFIP requirements. The Zoning Regulations require, for example, one foot of freeboard between first floors of structures and the FEMA BFE, and define substantial improvement to a building as the cumulative cost of work performed over the course of one year.

The Town also has Subdivision Regulations that require adequate drainage (Section 6.4) be provided to reduce exposure to flood hazards. Regulations covering development in and/or near inland wetland areas also exist within the Inland Wetlands and Watercourses Regulations.

Acquisitions, Elevations, and Property Protection

The Town acquired the Norton Paper Mill Property in 2014, removed the Norton Paper Mill Dam on the site, and is converting the property to a park to encourage recreational access to the river and maintain the land as open space. This acquisition and subsequent project removed the risks posed by the existence of a dam on the site, will prevent future development from occurring within the flood hazard zone, and will limit watershed land-use changes that could increase flooding downstream.

No other acquisitions or elevations of floodprone properties have occurred since the previous HMP. Property protection has focused instead on preventive measures and maintaining and upgrading drainage systems.

Flood Watches and Warnings

The First Selectman and the Fire Companies access weather reports through the National Weather Service and local media. Colchester also participates in the CT Alerts "Everbridge" Emergency Alerting and Notification Reverse 9-1-1 System and actively recruits its residents and businesses to enroll in the service. As a result, Colchester has the capability to telephone warnings into specific areas of Town. Use of this service allows the town the ability to receive geographically specific weather warnings when storms are imminent.

Policies relevant to inland flood mitigation in Colchester include:

- Current participation and a policy of continued future participation in the NFIP
- Drainage system inspection and maintenance is the responsibility of the DPW
- The DPW and Fire Company respond to public complaints about flooding and drainage issues
- Zoning regulations require one foot of freeboard above the FEMA BFE
- Zoning regulations define substantial improvement as cumulative over one year
- Subdivision Regulations require adequate drainage be constructed on new developments

Relevant programs include:

- A bridge scour management program that protect bridges through riprap placement
- Catch basin and culvert monitoring and maintenance
- A reverse 9-1-1 system to warn residents of impending hazard events
- A modest private property acquisition and open space creation program

The Town continues to restrict building activities inside floodprone areas and control construction of bridges, culverts, and drainage systems. These processes are carried out by the Planning and Zoning Department, Department of Public Works, and Town Engineer.

Summary

The Town continues to have strong riverine and pluvial flood mitigation capabilities, and continuously works to improve these capabilities when able and feasible.

5.2.3 Vulnerabilities and Risk Assessment

This section discusses specific areas at risk to riverine and pluvial flooding within Colchester.

UConn CIRCA has developed a tool to aid in understanding flood vulnerability for communities across the state. This tool, known as the Climate Change Vulnerability Index (CCVI), is comprised of dozens of factors that contribute to a community's flood sensitivity, exposure, adaptive capacity, and ultimately the overall flood vulnerability. The CCVI has been used as a tool to characterize flood vulnerability for the town. The distribution of flood vulnerability throughout the community can be seen in Figure 5-1. The CCVI demonstrates that flood vulnerability in the town ranges from low to moderate. Most of the vulnerability score is due to the Meadow Brook and Judd Brook.

Vulnerability Analysis of Areas along Watercourses

Parts of Dickinson Creek, the Salmon River, the Blackledge River, the Jeremy River, Meadow Brook, Pine Brook and Babcock Pond, Gillette Brook, Day Meadow Brook, Judd Brook, Governor Brook, Nelkin Brook, Cabin Brook, Hall Brook, Sherman Brook, Deep River and the Deep River Reservoir, Standish Brook and Witch Meadow Brook are associated with a SFHA. Sections of the Judd Brook, Day Meadow Brook and Meadow Brook are mapped as the SFHA Zone AE, indicating that flood elevations are available. Additional mapped SFHA floodplains are Zone A, indicating that elevations are not available.

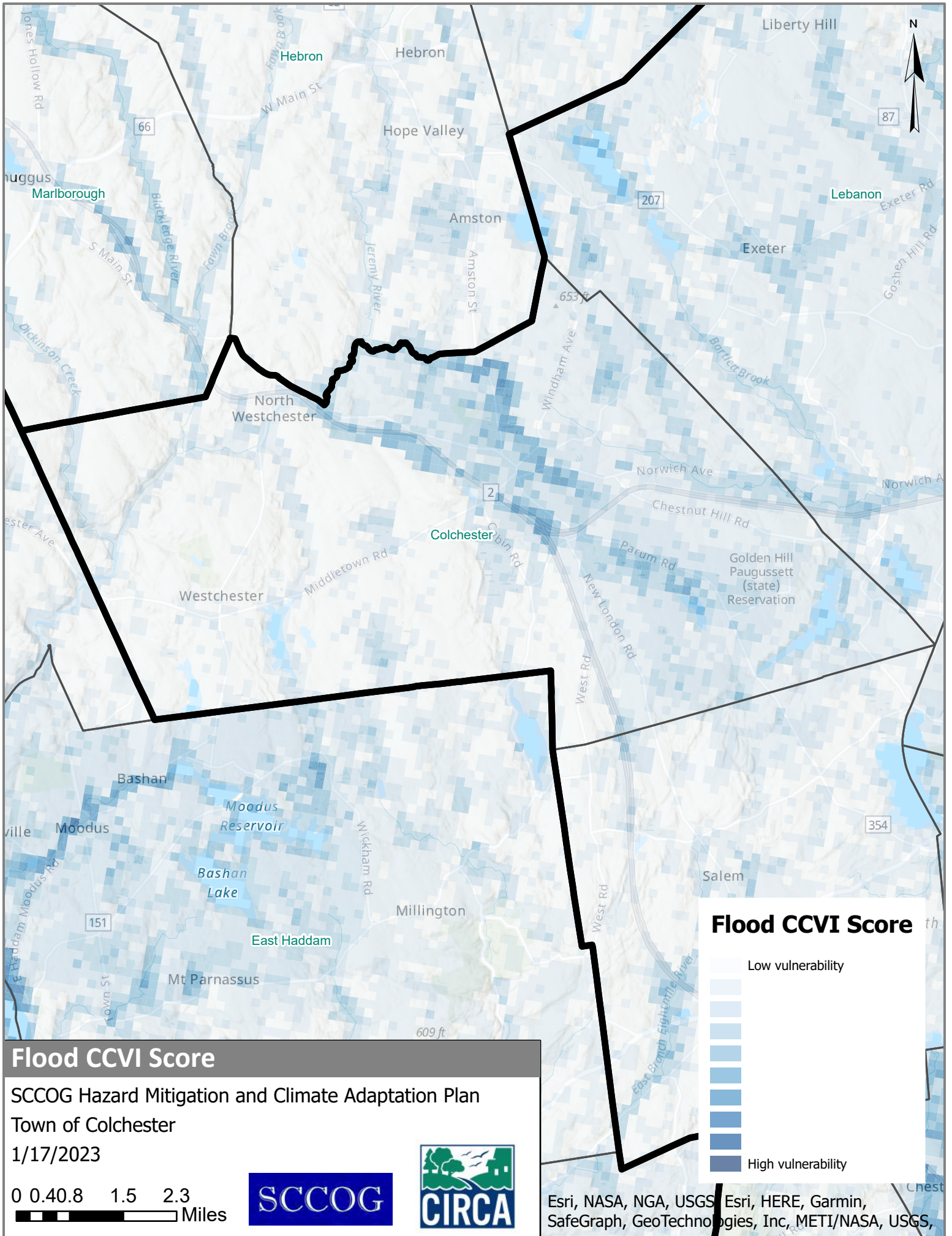
The DFIRMs adopted in 2011 revealed two relatively large changes in Colchester: the Boretz Road area and the area adjacent to the Settlers Green residential project described in Section 2.0. A LOMR was reportedly completed for the Settlers Green project.

Refer to Figure 5-2 for the location of SFHAs within Colchester. There are a few areas of town where flooding is hazardous to residents, buildings, or roadways:

- Lakeview Drive at Pickerel Lake suffers from poor drainage and nuisance flooding.
- An older subdivision in the Town Center experiences frequent basement flooding.
- A few bridges in Town are currently subject to ongoing scour.
- One home on Caverly Mill Road is subject to unsafe access conditions during significant floods. The wooden bridge requires beam replacement, yet still will be impassible.

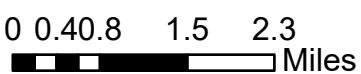
The DFIRM mapping suggests that these transportation routes can be negatively affected by extreme flooding:

- Route 2, which is oriented east-west and runs from Lebanon to Marlborough across the center of Colchester,
- Route 16, which is oriented northeast-southwest and also enters Colchester from Lebanon to the east, but exits into East Hampton in the west,
- Route 11 which runs from Route 2 just south of the center of Colchester southerly to Salem, and
- Route 85 which extends from the Salem town line northerly through the Town Center and continues north into Hebron.

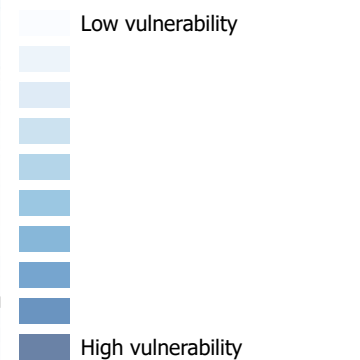


Flood CCVI Score

SCCOG Hazard Mitigation and Climate Adaptation Plan
 Town of Colchester
 1/17/2023



Flood CCVI Score



Esri, NASA, NGA, USGS, Esri, HERE, Garmin, SafeGraph, GeoTechnologies, Inc, METI/NASA, USGS,

The DFIRM mapping shows FEMA flood zones stretching across all major roadways. According to town officials, the most problematic areas are those bridges that are subject to scour. The town wishes to place riprap in these locations to prevent further scour. The town reported the following locations to be the most challenging during floods:

- Clark Road (brook flows underneath)
- Bull Hill Road (brook flows underneath)
- Harbor Road (two cross-culverts)
- Caverly Mill Road
- Marvin Road (brook flows underneath)
- Paper Mill Road

Recently, a washout occurred at Harbor Road; this was paired with riprap after the incident. Caverly Mill Road had a washout, however this bridge and road has recently been replaced and elevated. Marvin Road, which is located upstream of the Deep River Reservoir, tends to flood during rain events.

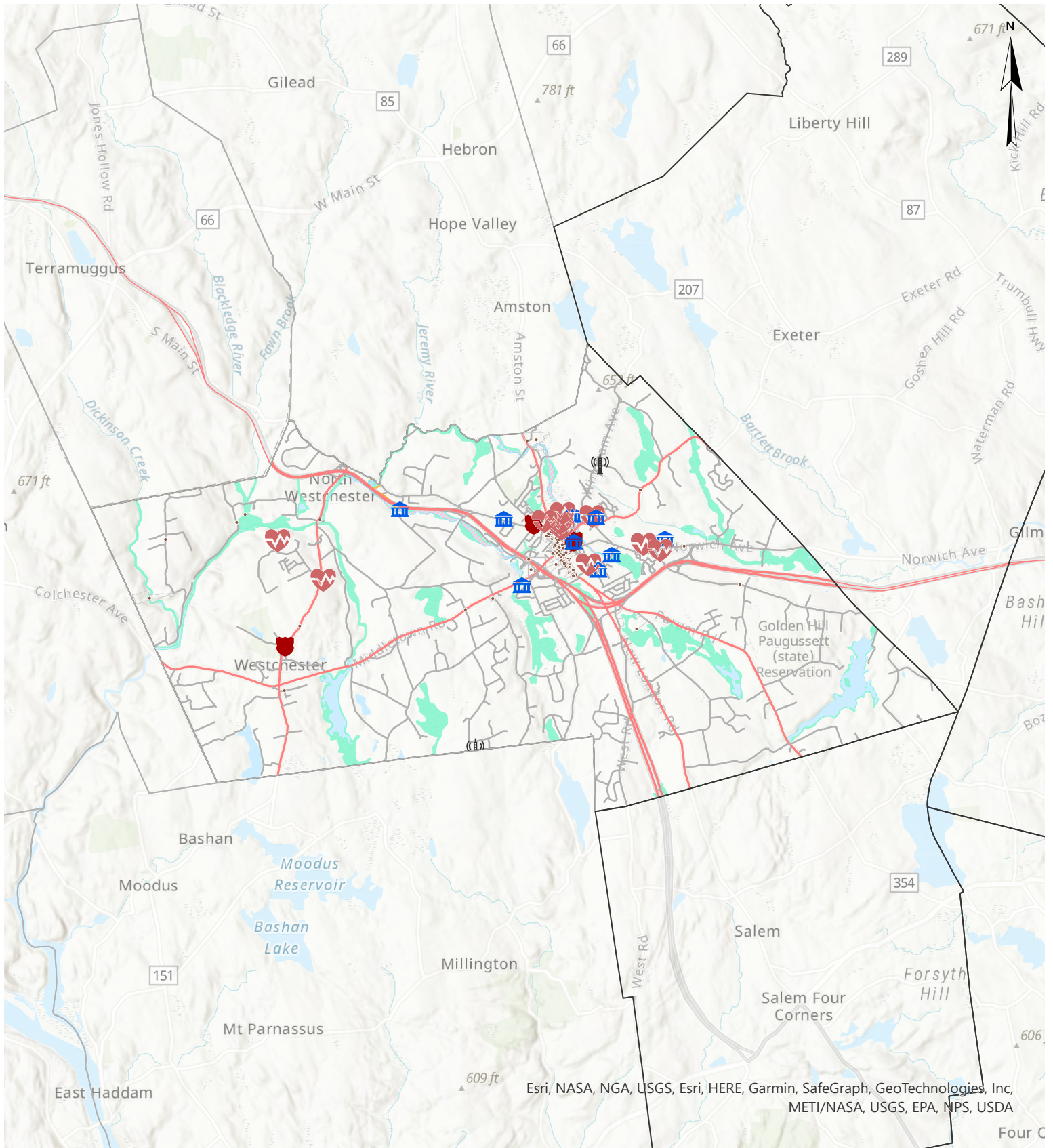
Vulnerability Analysis of Private Properties

The majority of structures in the floodplain are located in and around the Town Center and along Route 2 from the Town Center north towards the Hebron town line. Many of these structures are residential while a few are either commercial or industrial.

Town personnel indicate that structures typically do not get flooded in Colchester due to riverine or overbank flood conditions, despite their locations in SFHAs. As shown in the table of the Multi-Jurisdictional HMP, there are no repetitive loss properties in town. Such properties are those which have received two or more claim payments of more than \$1,000 from the NFIP with any rolling 10-year period for the home or business.

Vulnerability Analysis of Critical Facilities

As noted in Section 2.7, critical facilities that are structures are not located within SFHAs. The Town's public water supply wells are located in SFHAs but the wellheads are raised above base flood elevations. Therefore, flood risks to critical facilities are low.

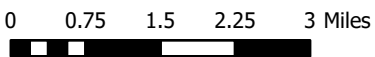


Critical Facilities and Historic Resources with Flood Zones

SCCOG Hazard Mitigation and Climate Adaptation Plan

Town of Colchester

Date: 8/1/2022



Legend

- Historic Resources
- Communication Infrastructure
- 911 Emergency Services
- M Municipal
- H Care and Medical Facility
- 1% Annual Chance Flood Hazard Area
- .2% Annual Chance Flood Hazard Area
- Floodway

Esri, NASA, NGA, USGS, Esri, HERE, Garmin, SafeGraph, GeoTechnologies, Inc, METI/NASA, USGS, EPA, NPS, USDA

Four C

5.2.3.1 Hazard Losses

According to NFIP statistics, as of June 30, 2022, the Town of Colchester has had a total of five flood related losses, with a total \$6,203 paid towards the claims.

In addition, the town received FEMA PA reimbursement for the September 2018 Storms and Flooding event (DR-4410). The town received \$45,044 from FEMA for a reported total of \$60,058 in project needs after the event. All funds were allocated under the “roads and bridges” category.

FEMA HAZUS-MH 6.0 was used to develop losses associated with the 100-year riverine flood event. Table 5-1 presents flood related damages for the Town of Colchester. Additional HAZUS-generated losses for the town and region can be found in the Multi-Jurisdictional document.

Table 5-1 HAZUS-MH Riverine Flood Related Economic Impacts

Colchester	2022 Results				
	RES	COM	IND	OTHER	TOTAL
Direct					
Building	\$1,880,000	\$410,000	\$360,000	\$210,000	\$2,860,000
Contents	\$830,000	\$1,050,000	\$660,000	\$1,070,000	\$3,610,000
Inventory	\$0	\$190,000	\$90,000	\$70,000	\$350,000
Subtotal	\$2,710,000	\$1,650,000	\$1,110,000	\$1,350,000	\$6,820,000
Business Interruption					
Income	\$0	\$920,000	\$20,000	\$210,000	\$1,150,000
Relocation	\$710,000	\$290,000	\$20,000	\$290,000	\$1,310,000
Rental Income	\$250,000	\$200,000	\$0	\$110,000	\$560,000
Wage	\$0	\$1,120,000	\$30,000	\$5,590,000	\$6,740,000
Subtotal	\$960,000	\$2,530,000	\$70,000	\$6,200,000	\$9,760,000
Total	\$3,670,000	\$4,180,000	\$1,180,000	\$7,550,000	\$16,580,000

5.3. Drought

5.3.1 Setting and Recent Occurrences

A drought can occur during any season when there is a long, abnormally dry period of time. These events are naturally occurring during periods of limited precipitation. The effects of drought may vary throughout Town, with some sectors impacted more than others.

In recent years, droughts have become flashier and more frequent throughout the region. During recent events, there have been reports in the region of wells going dry on residential and farming properties. Some of the more severe and impactful events include:

- **2016** – A statewide drought that lasted almost two years and peaked in 2016, resulted in water conservation efforts throughout the southeastern part of the region, elevated fire risks in some areas, and was noted as the 11th driest spring on record.

- **2020** – From June to December, New London County experienced a moderate to severe drought, with the county being declared a Stage 3 by the Connecticut Interagency Drought Work Group.
- **2022** – During the development of this plan, the region is in an ongoing drought, with severe drought conditions in August 2022. The County was declared a Stage 3 drought emergency on August 18, 2022.

5.3.2 Existing Capabilities

The Town of Colchester, like many other communities, does not have specific regulations that are geared toward drought mitigation. The Zoning Regulations have been developed with one purpose being to preserve water resources.

The town has regulations in place for certain development that require multi-family structures, future-development (commercial) by serviced by public water. The regulations also promote green stormwater designs, which allows for increased percolation during rain events, helping to restore rainwater back to the aquifer.

5.3.3 Vulnerabilities and Risk Assessment

The entire Town of Colchester is vulnerable to drought, the degree of vulnerability varies. Agricultural operations in town may experience irrigation or livestock watering challenges during a drought, particularly if that operation relies on wells as the primary water source. Also, about half of the town relies on private wells for their residential or commercial drinking water. These wells could be also impacted during a drought, limiting water supplies.

5.3.3.1 Hazard Losses

There have been no reported drought losses for the Town of Colchester. Downscaled drought losses from the 2019 Connecticut Natural Hazard Mitigation Plan are developed in the Multi Jurisdiction document.

5.4. Dam Failure

5.4.1 Setting and Recent Occurrences

Dam failures can be triggered suddenly with little or no warning and often in connection with natural disasters such as floods and earthquakes. Dam failures can occur during flooding when the dam breaks under the additional force of floodwaters. In addition, a dam failure can cause a chain reaction where the sudden release of floodwaters causes the next dam downstream to fail. While flooding from a dam failure generally has a limited geographic extent, the effects are potentially catastrophic depending on the downstream population. A dam failure affecting Colchester is considered a possible event each year with potentially critical effects. No dam failures have affected the town since the time of the last HMP.

5.4.2 Existing Capabilities

The dam safety statutes are codified in Section 22a-401 through 22a-411 inclusive of the Connecticut General Statutes. Sections 22a-409-1 and 22a-409-2 of the Regulations of Connecticut State Agencies have been enacted, which govern the registration, classification, and inspection of dams. Dams must be

registered by the owner with the DEEP according to Connecticut Public Act 83-38. Owners of high and significant hazard dams are required to maintain EAPs for such dams.

The Connecticut DEEP administers the Dam Safety Section and designates a classification to each state-registered dam based on its potential hazard as detailed in the regional plan. Owners of high and significant hazard dams are required to maintain Emergency Action Plans (EAPs), updated every two years, for such dams.

As noted in the Multi-Jurisdictional HMP, the lone high or significant hazard dam in Colchester is the Deep River Reservoir Dam, a Class C (high hazard) dam located near the Lebanon town line (Figure 5-3). The EAP for this dam was revised in 2015 to include new failure analysis and inundation mapping. The inundation area is downstream of the dam, entirely outside of Colchester.

The Norton Paper Mill Dam was demolished in 2014, removing all risk of dam failure at that site.

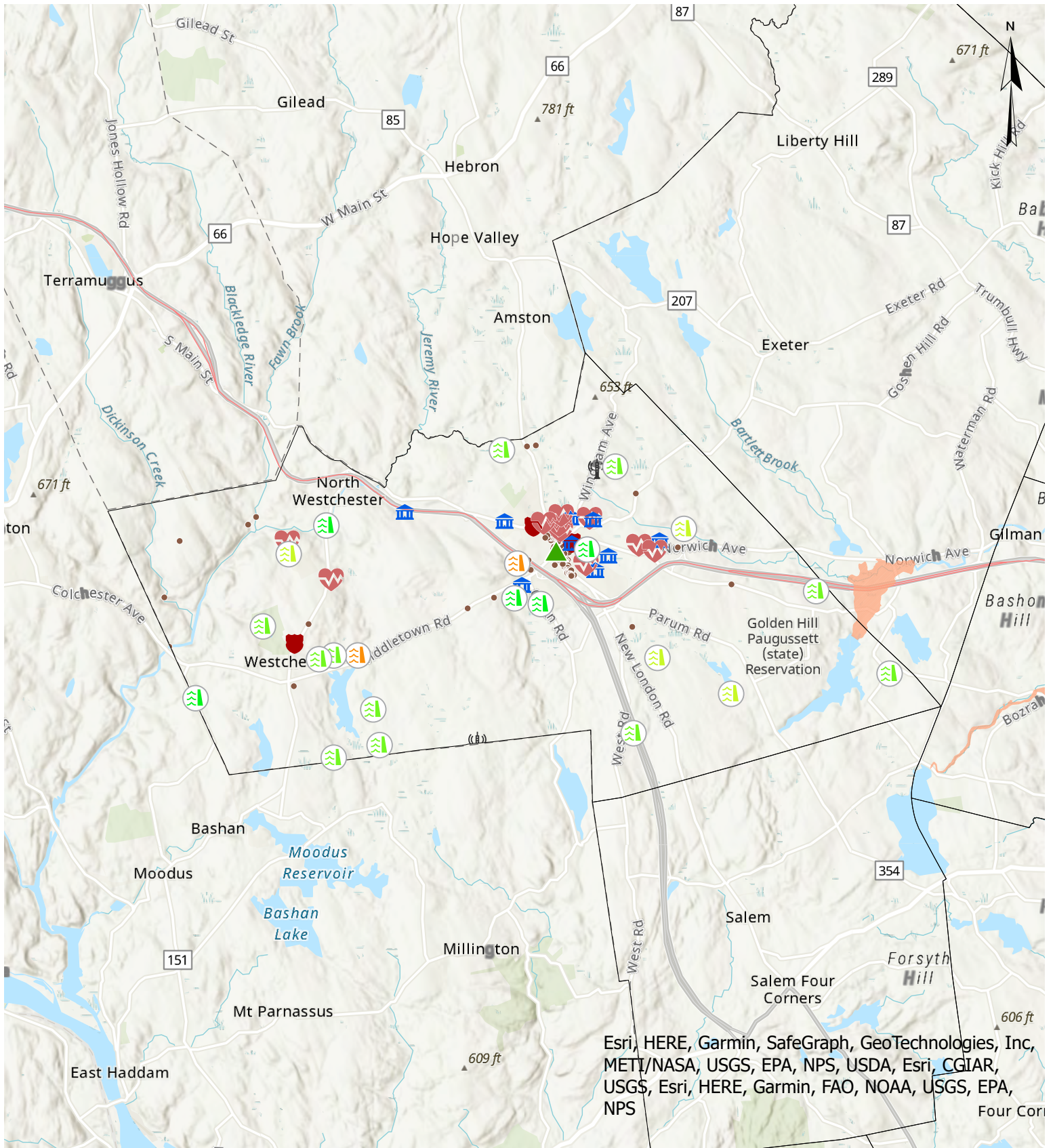
Town staff report that they regularly act as a liaison between DEEP and private dam owners, actively helping those owner navigate DEEP requirements.

Summary

Policies and Programs in Colchester that serve to mitigate dam failure hazards include removal of dams when possible and appropriate, and assisting private dam owners meet DEEP requirements. In general, municipal capabilities to mitigate dam failure damage have not increased significantly since the 2017 edition of the hazard mitigation plan was adopted. However, changes in the State's regulation of dams have increased Statewide capabilities sharply.

Table 5-2 Dams Registered with DEEP in the Town of Colchester

CT Dam#	Dam Name	Dam Class	Owner Type
2818	Palmer Pond	-	Private Corporation
2803	Day Pond(Colchester)	A	State Owned
2805	Pine Meadows Park Pond Pond Dam	A	Private
2808	Hall Pond Lower	A	Private
2810	Mackas Pond Dam	A	Private
2813	Fish & Game Club Lake	A	Private Club
2817	Moroch Pond Dam	A	Private
2819	Stula Pond	A	Private
2825	Standish Pond	A	State Owned
2826	Number Two Pond Dam	A	State Owned
2815	Ruby Cohens Pond	AA	Municipal
2820	Macdonald Swamp Pond	AA	Municipal
2822	Barker's Dam	AA	Private
2824	Raczewski Dam	AA	Private
2804	Babcock Pond Dam #1	BB	State Owned
2801	Deep River Reservoir Dam	C	Municipal

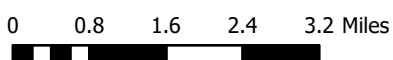


Dams and Dam Failure Inundation Areas

Southeaster Connecticut Council of Governments

Town of Colchester

Date: 2/23/2023



Legend

Dams

- Unknown/Unclassified
- A
- AA
- BB
- Historic Resources

- Communication Infrastructure
- Emergency Services
- Municipal
- Shelter or Cooling Center
- Care and Medical Facility
- Dam Failure Inundation Area

5.4.3 Vulnerabilities and Risk Assessment

As mentioned above, the Deep River Reservoir Dam (Class C) is the lone high hazard (Class C) or significant hazard (Class B) dam in Colchester, although 14 additional CT DEEP-registered dams ranging in classification from BB to unclassified are located within town limits according to the Dam Safety Section². There are also seven dams in town that are not registered with DEEP. These are classified as A, AA, BB, or unclassified.

Failure of a Class C dam would result in any of the following: loss of life; major damage to habitable structures, residences, hospitals, convalescent homes, schools, and main highways; and a significant economic loss.

The description of the Deep River Reservoir Dam below is based on information from previous editions of this plan. The information was acquired from the Connecticut DEEP Dam Safety Section and in files of Norwich Public Utilities and previous consultants. It is noted that the failure of any of the other dams in Town could also have impacts on human life and property within Colchester, although these are not discussed in detail here in favor of the high hazard class.

- Deep River Reservoir is a Class C dam located at the north end of the reservoir, upstream of the Deep River Water Treatment Plant and Reservoir Avenue. This dam is owned by Norwich Public Utilities.

According to a 2017 Dam Inspection report by Milone & MacBroom, Inc., the dam consists of an earthen embankment with a concrete core wall, a stepped concrete spillway, and a gatehouse with outlet works. In 1972, the dam was raised by 24 feet to its present configuration.

Construction included a new earthen embankment, concrete spillway, a gatehouse, and auxiliary earthen dike and spillway. The dam is 810 feet long, 62 feet high, and has an average top width of 20 feet. The dam outlet consists of a 42-inch steel pipe within a 48-inch diameter concrete pipe. The outlet pipe divides to two branches downstream of the dam, a 30-inch pipe and a 42-inch pipe. The 30-inch pipe discharges to the water treatment plant located several thousand feet downstream. The 42-inch pipe releases to the downstream channel at the toe of the slope. The spillway is a 90-foot wide concrete ogee crest structure.

The spillway channel is a 90-foot wide concrete chute with 10-foot high walls. A concrete gatehouse/outlet works control tower is centrally located on the upstream side of the dam.

The dam is equipped with a breakaway dike located along the northwest shoreline of the reservoir. The dike is earthen and approximately 240 feet long. The left and right shorelines of the dike are lined with riprap and overgrown with vegetation. The center 50 feet is unprotected and constructed of fine earthen material such that the central section would give way when water levels in the reservoir are rising. The crest of the dike was approximately 20 feet above the reservoir water level on the date of inspection. Water escaping the reservoir through the dike is constrained by natural topography and eventually flows into the inundation area downstream of the Deep River Dam in the low lying area adjacent to the water treatment plant. The topography downstream of the dike has been modified to create a flow path through a

² A registered dam query, dated 9/2/2022, was provided by the DEEP Dam Safety Section

naturally existing chute. The flow path has been lined with riprap, presumably to provide erosion protection.

The spillway discharges to Deep River, which flows under Reservoir Road through twin culverts. Deep River flows through a marshy lowland before intersecting Route 2. The culvert under Route 2 is a 13-foot high by 16-foot wide cast-in-place concrete box culvert with flared wingwalls. Downstream of Route 2, the Deep River joins Sherman Brook and flows into the Yantic River.

The Deep River Dam EAP from 2017-2018 includes a dam failure inundation area. Dam failure could result in damage to Route 2 and to several houses located approximately 2,500 feet downstream of the dam. However, only one structure owned by Norwich Public Utilities would be damaged in Colchester. The inundation area includes the Deep River Water Treatment Plant as well as the Lebanon Pines alcohol and drug rehabilitation facility in Lebanon.

The additional 14 dams held either a moderate hazard potential (Class BB), a low hazard potential (Class A), or were unranked. According to the same data file, the Pine Brook subregional basin has the most number of dams in four, followed by the Meadow Brook and the Latimer basin with three each. The remaining dams are located in six of the remaining 16 drainage basins.

Due to the fact that Colchester has only one Class C dam, Colchester is considered a low-risk area for adverse impacts due to dam failure.

5.4.3.1 Hazard Losses

There are no reported losses for the Town of Colchester related to dam failure. Downscaled losses from the 2019 Connecticut Natural Hazard Mitigation Plan are developed in the Multi-Jurisdictional document.

6. Rising Temperatures

6.1. Climate Change Impacts

On average, the annual temperature across the U.S. has increased by 1.8 degrees Fahrenheit when looking at the entire period of record (1895-2016). Accelerated warming patterns between 1979 and 2016 have been observed with satellite and surface data, and paleoclimate records show that some of the recent decades have been the warmest in the past 1,500 years.³

In general, periods of freeze and frost have decreased, therefore lengthening the period of time between the first winter freeze and spring thaw, since the early 1900's. These warming temperatures impact snowfall and accumulation, alter seasonal patterns, and can disrupt certain natural processes. In addition, warming temperatures can act as fuel for other natural hazards such as wildfires, droughts, hurricanes and severe storms, and also play a role in changing precipitation patterns.

In addition to exacerbating some natural hazards, extreme heat waves are becoming more frequent, which can also have a serious impact on public health. In recent years, the region has experience numerous heat waves, with several consecutive days of extremely hot temperatures and high heat indexes. Infrastructure can also be at risk during heat waves as some components, such as roadways or bridges, have not been designed to withstand ongoing, extreme temperatures.

6.2. Extreme Heat

6.2.1 Setting and Historic Record

An extreme heat event can occur at any time during the warmer months, and can be defined as temperatures that hover 10 degrees or more above the average high temperature for the region. These events typically last for a prolonged period of time and is accompanied by high humidity. A heat wave, typically lasts three or more days with temperatures over 90 degrees for those days.

Since 2012, 480 days over 85 degrees have been recorded at the Norwich Public Utilities weather stations, 165 of which were over 90 degrees. During the summer of 2022, 45 days over 85 degrees were recorded, 21 of which were at least 90 degrees. A majority of these high temperature days occurred in July and August, with some of these extreme temperatures occurring outside summer months in May and October. Table 6-1 presents the daily maximum temperatures recorded at the Groton New London Airport and Norwich Public Utilities weather stations. Those values that are bold indicate days over 90 degrees.

Table 6-1 Daily Maximum Temperatures from May to September Since 2017

	May		June		July		August		September	
	GNL	NPU	GNL	NPU	GNL	NPU	GNL	NPU	GNL	NPU
2017	85	93	89	94	88	92	87	89	86	89
2018	80	91	87	90	89	101	91	94	90	92
2019	83	85	88	91	94	96	88	91	87	84
2020	75	81	82	91	92	96	89	92	87	87
2021	88	87	86	96	86	94	88	96	82	85
2022	93	92	85	92	91	96	91	94	94	85

³ <https://nca201758.globalchange.gov/chapter/2/>

6.2.2 Existing Capabilities

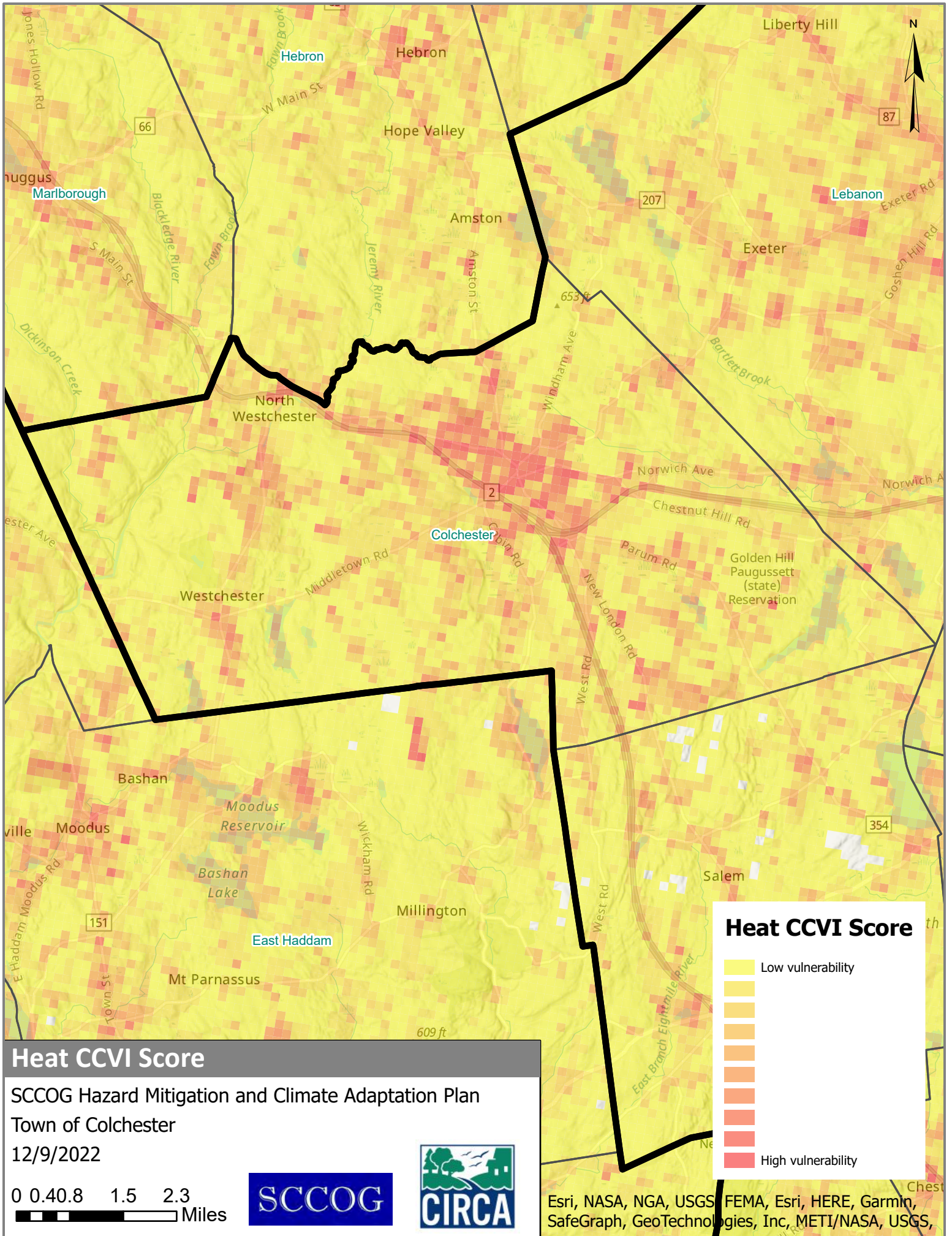
The Town of Colchester has identified four potential cooling centers in town. In order of preferred designation, these include the Bacon Academy (because this is already a designate shelter), the fire department company 1 meeting room, and possibly the library or the town hall. The library is the only facility of the four that does not have a generator, therefore limiting the capacity if a heat event coincided with a power outage.

6.2.3 Vulnerabilities and Risk Assessment

While the entire town is at risk of an extreme heat event, vulnerability can widely vary based on age, health, or the type of property owned in Colchester. The elderly populations in town are more vulnerable to extreme heat events, particularly when in home cooling is not available. Also, those with certain health conditions may also be more vulnerable to the health factors associated with extreme temperatures.

UConn CIRCA has developed a tool to aid in understanding extreme heat vulnerability for communities across the state. This tool, known as the Climate Change Vulnerability Index (CCVI), is comprised of dozens of factors that contribute to a community's heat sensitivity, exposure, adaptive capacity, and ultimately the overall heat vulnerability. The CCVI has been used as a tool to characterize heat vulnerability for the Borough. The distribution of heat vulnerability throughout the community can be seen in Figure 6-1.

While much of Colchester enjoys low heat exposure and sensitivity, the town center and its surrounding area experience both. The higher exposure and sensitivity in this area is due to the confluence of multiple transportation routes, including Rt 2 and Rt 16, as well as impervious surfaces and social vulnerabilities. Colchester has multiple existing and potential cooling centers, resulting in strong adaptive capacity for the east side of the municipality. Therefore, the overall heat vulnerability for Colchester is low to moderate depending on the area.



Heat CCVI Score

SCCOG Hazard Mitigation and Climate Adaptation Plan
 Town of Colchester
 12/9/2022

0 0.4 0.8 1.5 2.3 Miles



Esri, NASA, NGA, USGS, FEMA, Esri, HERE, Garmin, SafeGraph, GeoTechnologies, Inc, METI/NASA, USGS,

6.2.3.1 Hazard Losses

There are no reported losses for the Town of Colchester related to extreme temperatures. Future editions of this plan will revisit this topic.

6.3. Wildfires

6.3.1 Setting and Recent Occurrences

Wildfires are considered to be highly destructive, uncontrollable fires. The most common causes of wildfires are arson, lightning strikes, and fires started from downed trees hitting electrical lines. Thus, wildfires have the potential to occur anywhere and at any time in both undeveloped and developed areas of Colchester. Structural fires in higher density areas of the town are not directly addressed herein.

According to town officials, Colchester has experienced a few multi-acre burns including a 25 acre burn in the Babcock Wildlife area over a decade ago. Small fires have historically occurred during dry spring weather in Connecticut.

6.3.2 Existing Capabilities

Monitoring of potential fire conditions is an important part of mitigation. The Connecticut DEEP Forestry Division uses the rainfall data recorded by the Automated Flood Warning system to compile forest fire probability forecasts. This allows the DEEP to monitor drier areas to be prepared for forest fire conditions. The town can access this information over the internet. The town also receives "Red Flag" warnings via local media outlets.

Existing mitigation for wildland fire control is typically focused on building codes, public education, Fire Department training, and maintaining an adequate supply of equipment. The two Colchester Fire Companies have access to both a Gator ATV and a brush truck. Construction of emergency fire access routes is required in new developments.

The Colchester Fire Department regularly reviews and maintains its firefighting-water supply, ensuring it is able to fight fires throughout Town, both in areas served by public water supply and those outside of the service area. The Department has an ongoing dry-hydrant development program for areas without public water supply. The town is continuously working to install fire ponds and dry hydrant whenever possible. Also, developers are installing them at the request of the town. Colchester is working to incorporate certain requirements into the zoning and subdivision regulations. Since the previous HMP, the dry hydrant located at Papermill Road (for which the Norton Paper Mill Dam impoundment was the water source) was made obsolete by removal of the Norton Paper Mill Dam. A new dry hydrant was installed on Waterhole Road near Stoneridge Road.

The Town recently developed a new well within the public water system since the 2017 HMP, increasing the system's water capacity. It has also developed a high pressure zone. Both projects have increased firefighting capability within the area served by the public water system.

The Connecticut DEEP has recently changed its Open Burning Program. It now requires individuals to be nominated and designated by the Chief Executive Officer in each municipality that allows open burning and to take an online training course and exam to become certified as an "Open Burning Official."

Colchester has designated two Open Burning Officials. Permit template forms were also revised that provide permit requirements so that the applicant/permittee is made aware of the requirements prior to, during, and after burn activity. The regulated activity is then overseen by the Town.

The Town often recommends a fire pond or dry hydrant for new developments; however, neither is required. Draft subdivision amendments which have yet to be approved have some language regarding fire ponds and dry hydrants, although neither is required for new developments.

Information about the dangers of wildfires and how to prevent wildfires is available through the Town website and in Town Hall. The Colchester Fire Department Website includes a link to DEEP's Daily Forest Fire Danger Report website.

Summary

Colchester policies that mitigate wildfire hazards include:

- Enforcement of wildfire-mitigation measures within the Town's building code and zoning regulations
- Participation in the State's Open Burning Program

Relevant programs include:

- Ongoing evaluation and expansion of the Town's dry hydrant network
- Improvement of the Town's public water system
- Public outreach, awareness, and education programs, including hosting wildfire awareness and DEEP fire danger level information on the Town website and at Town Hall
- Ongoing review of and upgrades to the fire departments firefighting equipment

Between these policies and programs, the Gator all-terrain vehicle (ATV) and brush truck available to both Fire Companies, and ongoing firefighter training, Colchester believes its services are fully capable. The Volunteer Fire Companies will continue to evaluate the level of risk and the need for additional hydrants or fire ponds as development continues in the future.

6.3.3 Vulnerabilities and Risk Assessment

Forests and inaccessible tracks of land are at the highest risk for wildfires. However, according to town officials, the only area that was specifically mentioned as having a significant wildfire in the past is the Babcock Wildlife Area which is described above in Section 6.3.1. The town feels that the Gator ATV and brush truck are sufficient, along with existing fire ponds and dry hydrants. Refer to Figure 3-6 in the Multi-Jurisdictional HMCAP for a general depiction of wildfire risk areas region-wide.

6.3.3.1 Hazard Losses

There are no reported losses for the Town of Colchester related to wildfires. Downscaled losses from the 2019 Connecticut Natural Hazard Mitigation Plan using WUI acreage are developed in the Multi-Jurisdictional document.

7. Earthquakes

7.1. Climate Change Impacts

Earthquakes are not a climate related hazard, therefore there are no expected impacts as a result of climate change. There are however secondary impacts that could be a concern and amplify the damages of an earthquake. The deterioration of infrastructure from extreme heat or salt water as a result of coastal flooding or sea level rise, may weaken certain components making them more prone to damage or collapse during an earthquake event. Flooding events can also leave some landscapes at a higher risk of landslides; an earthquake could potentially prompt a landslide in post-flooded areas.

7.2. Earthquakes

7.2.1 Setting and Recent Occurrences

An earthquake is a sudden rapid shaking of the earth caused by the breaking and shifting of rock beneath the earth's surface. Earthquakes can cause buildings and bridges to collapse; disrupt gas, electric, and telephone lines; and often cause landslides, flash floods, fires, avalanches, and tsunamis. Earthquakes can occur at any time and often without warning. Detailed descriptions of earthquakes, scales, and effects can be found in Section 3.3.5 of the Multi-Jurisdictional HMP. Despite the low probability of an earthquake occurrence, earthquake damage presents a potentially catastrophic hazard to the town. However, it is very unlikely that the town would be at the epicenter of such a damaging earthquake. No major earthquakes have affected the town since the last HMP.

7.2.2 Existing Capabilities

The Connecticut Building Codes include design criteria for buildings specific to each region as adopted by Building Officials and Code Administrators (BOCA). These include the seismic coefficients for building design in Colchester. The town has adopted these codes for new construction, and they are enforced by the Zoning Enforcement Officer.

Due to the infrequent nature of damaging earthquakes, town land use policies do not directly address earthquake hazards. However, the potential for an earthquake and emergency response procedures is addressed in the town's EOP.

Summary

In general, municipal capabilities to mitigate earthquake damage have not increased since the 2017 edition of the hazard mitigation plan was adopted. This is because the hazard continues to pose a low risk of damage to the Town.

7.2.3 Vulnerabilities and Risk Assessment

Surficial earth materials behave differently in response to seismic activity. Unconsolidated materials such as sand and artificial fill can amplify the shaking associated with an earthquake. As noted in Section 2.1, areas adjacent to the most significant surface water bodies in Colchester including the Blackledge River, Salmon River, Deep River, Jeremy River, Meadow Brook, Judd Brook, Gardner Lake, Deep River Reservoir, and Bobcock Pond and some smaller water bodies have fairly extensive areas underlain by stratified drift. These areas are likely more at risk for earthquake damage than the areas of the town underlain by glacial till. The best mitigation for future development in areas of sandy material is the

application of the most stringent standards in the Connecticut Building Code, exceeding the building code requirements, or, if the town deems necessary, the possible prohibition of new construction.

Unlike seismic activity in California, earthquakes in Connecticut are not associated with specific known active faults. However, bedrock in Connecticut and New England in general is typically formed from relatively hard metamorphic rock that is highly capable of transmitting seismic energy over great distances. For example, the relatively strong earthquake that occurred recently in Virginia was felt in Connecticut because the energy was transmitted over a great distance through such hard bedrock.

The built environment in the town primarily includes some more recent construction that is seismically designed. However, most buildings were built before the 1990s and therefore are not built to current building codes. In addition, there are areas such as town parks with recreational buildings or shelters that may not be seismically designed. Thus, it is believed that most buildings would be at least moderately damaged by a significant earthquake. Those town residents who live or work in older, non-reinforced masonry buildings are at the highest risk for experiencing earthquake damage.

Areas of steep slopes can collapse during an earthquake, creating landslides. With a difference of upwards of five hundred feet in elevation, Colchester has areas of steep slopes and bluffs, although the majority of these features occur in undeveloped areas. Thus, landslides are not a great concern in the town.

Seismic activity can also break utility lines such as water mains, gas mains, electric and telephone lines, and stormwater management systems. Damage to utility lines can lead to fires, especially in electric and gas mains. Dam failure can also pose a significant threat to developed areas during an earthquake. For this HMP, dam failure has been addressed separately in Section 10.0. As noted previously, most utility infrastructure in the town is located above ground. A quick and coordinated response with Eversource will be necessary to inspect damaged utilities following an earthquake, to isolate damaged areas, and to bring backup systems online. The coordinated response is covered in the Colchester EOP.

A HAZUS-MH analysis of the potential economic and societal impacts to the SCCOG region from earthquake damage is detailed in the Multi-Jurisdictional HMP. The analysis addresses a range of potential impacts from any earthquake scenario, estimated damage to buildings by building type, potential damage to utilities and infrastructure, predicted sheltering requirements, estimated casualties, and total estimated losses and direct economic impact that may result from various earthquake scenarios.

7.2.4 Hazard Losses

There are no reported losses for the Town of Colchester related to earthquakes. Downscaled losses from the 2019 Connecticut Natural Hazard Mitigation Plan are developed in the Multi-Jurisdictional document. In addition, a *HAZUS-MH* analysis of the potential economic and societal impacts to the SCCOG region from earthquake damage is detailed in the Multi-Jurisdictional HMCAP. The analysis addresses a range of potential impacts from any earthquake scenario, estimated damage to buildings by building type, potential damage to utilities and infrastructure, predicted sheltering requirements, estimated casualties, and total estimated losses and direct economic impact that may result from

various earthquake scenarios. Potential economic impacts can be seen in Table 7-1, with additional information developed in the Multi-Jurisdictional document.

Table 7-1 HAZUS-MH Earthquake Related Economic Impacts

Colchester	Residential	Commercial	Industrial	Others	Total
	\$771,820,000	\$782,880,000	\$193,330,000	\$272,790,000	2,020,820,000

8. Mitigation Strategies and Actions

8.1. Status of Mitigation Strategies and Actions

A total of 11 hazard mitigation actions were developed in the previous edition of this plan. The status of each is listed below.

#	Mitigation Actions and Strategies for Colchester 2016 - 2021	Status	Status Details
1	Implement necessary actions to secure ARC-certification of the Jack Jackter Elementary School backup shelter.	Remove	This can be retired. Bacon Elementary is the shelter. Jack Jackter is the EOC, as was the case five years ago.
2	Develop and send out a Hazard Mitigation Information mailer every couple of years to provide residents with up-to-date information about local risks, mitigation and response measures, and actions they can take.	Remove	This can be retired in favor of a revision/recast. The Town has email blasts and social media for this purpose.
3	Provide brochures about hazard mitigation at the Public Library.	Remove	This can be retired.
4	Improve the visibility of hazard mitigation information on the Town Website	Carry Forward/ Capability	Much of this information comes out of the EOC during an event. The EOC is staffed by emergency staff, board of selectman, etc. They can provide the content for the web site. This appears to be a capability, but the action should be carried forward to ensure completion.
5	Revamp Connecticut Yankee early warning sirens and locate them around Town. Develop a protocol to use sirens to broadcast warnings and other information about emergency events	Carry forward with Revisions	Many siren boxes are located throughout town; a few are still operational, can be operated from the EOC, and are tested every six months. The only concern is the age of the units and the occasional need for parts. Revise this action to keep up with maintenance and look for opportunities to maintain system.
6	Update the Subdivision Regulations (Section 6.6) and Flood Hazard Areas Ordinance (Section 64.2) to integrate the most recent NFIP FIS and FIRM.	Carry forward	This may be completed, but not certain; the regulations are online so it should be possible to check – as of October 2022 this is incomplete. The regulations still reflect the 1992 FIRM.
7	Develop formalized guidance for culvert and bridge construction and replacement that requires utilization of the most up-to-date extreme rainfall data from http://precip.eas.cornell.edu (update to Zoning Regulations Appendix 1 S:2.1)	Capability	The designs for replacements are sometimes outsourced.
8	Elevate Caverly Mill Road and elevate and replace the Caverly Mill Road Bridge over Sherman Brook.	Complete	This was completed in 2020-2021. Sections of the road have been elevated and the bridge has been replaced and elevated.

9	Review the Snow and Ice Control Policy to determine whether updates are necessary. Update if necessary.	Capability	DPW uses road salt and sand in some locations. Catch basins are cleaned to remove sand as needed.
10	Consider placing fire pond or dry hydrants language into Subdivision Regulation amendments.	Carry forward with revisions	The town has been installing fire ponds and dry hydrants whenever the opportunity arises. Developers have been installing them at the request of the town. There may be revisions made to the zoning and subdivision regulations to make this a requirement (currently being considered by Planning & Zoning but not yet complete). Revise this action to ensure completion.
11	Determine whether a dry hydrant is needed to replace the one decommissioned with the removal of the Norton Paper Mill Dam. Install a new hydrant if needed.	Complete	The dry hydrant was retired when the dam was removed and the pool was eliminated. However, a formal pull-off has been added so that the Fire Department can bring in a vehicle and access the river for direct suction in an area where depth is 8-9 feet. This action can be considered complete.

During the planning process, CIRCA and consultant staff facilitated a discussion with the Town staff to identify the greatest climate change concerns and challenges. The previous actions were re-evaluated in this context. Elements of four prior actions have been carried forward into the new hazard mitigation and climate adaptation actions.

8.2. Prioritization of Specific Actions

The proposed actions for the Town of Colchester to undertake from 2023 through 2028 are listed in Table 8-1 on the next page. The full list of actions for the region with buildups for the PERSISTS and STAPLEE scores are available in the multi-jurisdiction document.

The actions with the highest PERSISTS score and the highest STAPLEE score are different, which is consistent with the intent of the two scores. PERSISTS scores tend to be higher for actions that maximize public safety while advancing climate science and being transferable to other communities, whereas STAPLEE scores tend to be higher for actions that are highly cost effective and technically feasible for reducing losses from hazards. The actions with the highest combined scores are:

- o Complete a drainage/flooding master plan for the town that prioritizes the stream crossings with the most needs.
- o Update the Subdivision Regulations and Flood Hazard Areas Ordinance to reflect the CT DEEP Model Flood Regulations.

The Town intends to focus on the above actions, along with the sole action about cooling centers:

- o Ensure that the new Senior Center includes cooling center capabilities and the appropriate resources needed for use such as standby power; and secure reliable transportation options for people to access cooling centers.

This is consistent with the State’s emphasis on cooling center resilience.

Table 8-1 Town of Colchester Actions and STAPLEE and PERSISTS Scores

Number	Hazard Mitigation and Climate Adaptation Actions	Hazard Mitigation and Climate Adaptation Goal	Type of Action	Responsible Department	Approx. Cost Range	Potential Funding Sources	Timeframe	Priority	PERSISTS Score	STAPLEE Score	PERSISTS x STAPLEE =
CO1	Ensure that the new Senior Center includes cooling center capabilities and the appropriate resources needed for use such as standby power; and secure reliable transportation options for people to access cooling centers.	Ensure that critical facilities are resilient, with special attention to shelters and cooling centers.	Preparedness & Emergency Response	Office of the Chief Elected Official	\$100,000 - \$500,000	FEMA HMA; Other preparedness grants; STEAP	7/2023 - 6/2025	High	16	6	96
CO2	Improve the visibility of hazard mitigation information on the Town Website	More than one goal	Education & Awareness	Emergency Management	\$0 - \$10,000	Municipal Operating Budget	7/2023 - 12/2023	Medium	13	4	52
CO3	Perform regular maintenance and upkeep of the re-purposed Connecticut Yankee early warning sirens, including acquiring the necessary parts for the system to make sure they remain usable for local notifications.	More than one goal	Preparedness & Emergency Response	Emergency Management	\$25,000 - \$50,000	Municipal CIP Budget; Preparedness Grants	7/2024 - 6/2025	Medium	13	3	39
CO4	Update the Subdivision Regulations and Flood Hazard Areas Ordinance to reflect the CT DEEP Model Flood Regulations.	Reduce flood and erosion risks by reducing vulnerabilities and consequences, even as climate change increases frequency and severity of floods.	Prevention	Land Use Staff	\$0 - \$10,000	Municipal Operating Budget	7/2023 - 12/2023	High	15	10	150
CO5	Develop fire pond and/or dry hydrants language to be incorporated into the next Subdivision Regulation amendments.	Reduce losses from other hazards that are affected by climate change.	Property Protection	Land Use Staff	\$0 - \$10,000	Municipal Operating Budget	7/2023 - 12/2023	Medium	13	9	117
CO6	Complete a drainage/flooding master plan for the town that prioritizes the stream crossings with the most needs.	Reduce flood and erosion risks by reducing vulnerabilities and consequences, even as climate change increases frequency and severity of floods.	Structural Projects	Public Works	\$50,000 - \$100,000	DEEP Climate Resilience Fund; Municipal Operating Budget; Municipal CIP Budget	7/2025 - 6/2026	Medium	22	8	176

Number	Hazard Mitigation and Climate Adaptation Actions	Hazard Mitigation and Climate Adaptation Goal	Type of Action	Responsible Department	Approx. Cost Range	Potential Funding Sources	Timeframe	Priority	PERISTS Score	STAPLEE Score	PERISTS x STAPLEE =
CO7	Require floodplain manager and land use staff to take free training at https://portal.ct.gov/DEEP/P2/Chemical-Management-and-Climate-Resilience/Chemical-Management-and-Climate-Resilience to reduce risks of spills from businesses during floods.	Reduce flood and erosion risks by reducing vulnerabilities and consequences, even as climate change increases frequency and severity of floods.	Education & Awareness	Land Use Staff	\$0 - \$10,000	Municipal Operating Budget	7/2023 - 12/2023	Low	14	6	84
CO8	Partner with chicken farms and related facilities to develop reliable, drought-resilience water supplies and standby power that is capable of operating cooling equipment.	Address risks associated with extreme heat events, especially as they interact with other hazards.	Preparedness & Emergency Response	Office of the Chief Elected Official	\$100,000 - \$500,000	USDA/NRCS; STEAP	7/2023 - 6/2026	High	17	6	102
CO9	Partner with chicken farms and related facilities to develop emergency response plans that describe how to manage extreme heat events, droughts, power outages, and avian flu outbreaks.	Address risks associated with extreme heat events, especially as they interact with other hazards.	Preparedness & Emergency Response	Office of the Chief Elected Official	\$0 - \$10,000	USDA/NRCS; SCCOG funds	7/2023 - 6/2026	High	18	8	144