TOWN OF MONTVILLE ANNEX DOCUMENT

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

March 2023

PREPARED FOR:
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ARC	American Red Cross	HMCAP	Hazard Mitigation and Climate Adaptation Plan
ARPA	American Rescue Plan	HMP	Hazard Mitigation Plan
BOCA	Building Officials and Code Administration	IA	Individual Assistance
CCVI	Climate Change Vulnerability Index	NCDC	National Climatic Data Center
CIP	Capital Improvement Plan	NCEI	National Centers for Environmental Information
CIRCA	Connecticut Institute for Resilience and Climate Adaptation	NFIP	National Flood Insurance Program
CL&P	Connecticut Light and Power	NOAA	National Oceanic and Atmospheric Administration
DCRF	DEEP Climate Resilience Fund	NRCS	Natural Resources Conservation Service
DEEP	Connecticut Department of Energy and Environmental Protection	NWS	National Weather Service
DFIRM	Delineated Flood Insurance Rate Map	PA	Public Assistance
DOT	Connecticut Department of Transportation	PERSISTS	Permittable Equitable Realistic Safe Innovative Scientific Transferrable Sustainable
DPW	Department of Public Works	PMF	Probable Maximum Flow
EMD	Emergency Management Director	POCD	Plan of Conservation and Development
EMS	Emergency Medical Services	RL	Repetitive Loss
EO	Executive Order	SCCOG	Southeastern Connecticut Council of Governments
EOC	Emergency Operation Center	SFHA	Special Flood Hazard Area
EOP	Emergency Operation Plan	STAPLEE	Social, Technical, Administrative, Political, Legal, Economic, and Environmental
FEMA	Federal Emergency Management Agency	STEAP	Small Town Economic Assistance Program
GC3	Governor's Council on Climate Change	USACE	United State Army Corps of Engineers
GIS	Geographic Information System	USDA	United States Department of Agriculture
HMA	Hazard Mitigation Assistance	WUI	Wildland-Urban Interface

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.

The purpose of this HMP annex is to provide an update to the hazard risk assessment and capability assessment provided in the previous HMP, and to evaluate potential hazard mitigation measures and prioritize hazard mitigation projects specific to mitigating the effects of hazards on the Town of Montville. Background information and the regional effects of pertinent hazards are discussed in the main body of the Southeastern Connecticut Council of Governments (SCCOG) Multi-Jurisdictional Hazard

Mitigation and Climate Adaptation Plan. Thus, this annex is designed to supplement the information presented in the Multi-Jurisdictional HMCAP with more specific detail for Montville and is not to be considered a standalone document.

1.2. Hazard Mitigation and Climate Adaptation Goals

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

Montville is a town of approximately 44 square miles that lies in west-central New London County and is bordered by the Towns of Preston and Ledyard to the east, the Town of Waterford to the south, the Towns of Salem and East Lyme to the west and the Town of Bozrah and City of Norwich to the north.

The most significant surface water body associated with Montville is the tidal Thames River which is the town's border with Preston and Ledyard to the east. The Thames River extends from Norwich to the north where it begins at the convergence of the Shetucket and Yantic Rivers, and flows southerly past New London Harbor into Fishers Island Sound.

Montville has several major transportation routes. The largest volume transportation route through Town is Interstate 395 (I-395) which extends from the Town of Waterford near the village of Uncasville in the south northward to the City of Norwich to the north. Running almost parallel to I-395 to the east and extending from the village of Uncasville to the City of Norwich is Route 32 which is the second largest route of egress with a north-south orientation in Montville. Route 2A, which connects Route 12 in the Town of Preston to I-395 in Montville, is the largest volume route of egress with an east-west orientation in Town. Routes 163 and 82 are two major east-west oriented routes of egress in Town with Route 82 extending east-west across northern Montville and Route 163 extending from Route 32 near the Oxoboxo River in southeastern Montville northwest and into the Town of Bozrah in northwestern Montville. Additionally, Route 85 moves traffic from the Waterford town line to the west of Lake Konomoc northwest to the town line with the Town of Salem.

2.1. Physical Setting

Montville is located in the west-central region of the SCCOG planning area. Elevations range from approximately 600 at the top of Chapel Hill near Montville Manor on Chapel Hill Road to sea level along the Thames River. Montville contains the villages of Chesterfield, Mohegan, Oakdale and Uncasville. Aside from the Mohegan Tribal Nation Reservation in the northeast corner of Montville (which is sovereign land rather than a part of the town), the most developed sections of Montville are the neighborhoods around Route 32 and Route 2A in the eastern section of town, and the village of Uncasville in southeastern Montville, extending northwest to Wheeler pond along Route 163 and Maple Avenue.

Western Montville contains a greater amount of undeveloped land and less dense development aside from the two large subdivisions, one located between Old Colchester Road and Chapel Hill Road and the other located on the corner of Chapel Hill Road and Chesterfield Road in the area known as "Four Corners." With the dense development in eastern Montville and the significantly less development in western Montville, the town maintains a rural to suburban nature.

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 Montville. Montville has thirteen bedrock formations which are generally situated in a northwest-southeast orientation. The Hope Valley Alaskite Gneiss Formation dominates the bedrock types in Montville covering approximately 36% of the Town's land, while approximately 28% of land is covered by the Plainfield Formation. The remaining approximately 36% of land area is covered by the remaining eleven formations.

Figure 2-1 Location of the Town of Montville in the SCCOG Region

Montville lies above the Honey Hill Fault zones oriented in this northwest-southeast direction. This zone is the location where Avalonia and North America met. The Honey Hill Fault is a significant fault zone that is considered moderately active by the Connecticut Department of Emergency Services and Public Protection and has been linked with recent small earthquake activity (on the order of 1 to 2 on the Richter scale) in East Haddam in April and May of 2012 as reported by the Weston Observatory at Boston College in Boston, Massachusetts.

Montville's surficial geologic formations include glacial till and stratified drift. Refer to the Multi-Jurisdictional HMCAP 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 adjacent to Latimer Brook, Bogue Brook, Bogue Brook Reservoir, Hunts Brook, Lake Konomoc, Sandy Brook, and their tributaries in southwestern Montville, Oxoboxo Brook, Fox Brook, Falls Brook, Stony Brook and their tributaries from northwest to southwest Montville, Trading Cove Brook along the northern town lines with Bozrah and Norwich, the Thames river along the eastern town lines with Preston and Ledyard and smaller tributaries have fairly extensive areas underlain by stratified drift.

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 above, the most significant surface water body in Montville is the Thames River. Additional significant watercourses include Oxoboxo Brook, Hunts Brook, Latimer Brook, Oil Mill Brook, Stony River, Whittle Brook/Gardner Lake (which becomes Gardner Brook) and Trading Cove Brook. Of the additional seven watercourses, only Latimer Brook and Oil Mill Brook both flow south westerly through the southwestern portion of town and Whittle Brook (Gardner Brook in Bozrah) which flows north-northwesterly through the northwestern portion of Montville, do not ultimately discharge to the Thames River. The remaining five watercourses flow southeast towards the Thames River moving from north to south through town are Trading Cove Brook, Stony Brook, Oxoboxo Brook and Hunts Brook. In total, there are approximately 16 named watercourses and many unnamed small tributaries in Montville.

There are a total of eight subregional watershed basins in Montville. The subregional basins are: Gardner Brook, Hunts Brook, Latimer Brook, Oil Mill Brook, Oxoboxo Brook, Stony Brook, Thames River and Trading Cove Brook. The Stony Brook and Oxoboxo subregional basins cover the majority of interior Montville and are adjacent to one another. The Oxoboxo Brook and Stony Brook subregional drainage basins cover the most land in town with 24% and 22% coverage, respectively.

The northwest corner of Montville is in the Gardner Brook subregional drainage basin which drains water to the north towards the Yantic River, while the Trading Cove Brook subregional basin stretches along most of the northern town line and drains to the Thames River. The Thames River subregional basin stretches from north to south along the eastern town line. The Hunts Brook drainage basin covers 17% of town draining water to the Thames River. The southwestern part of Montville is mostly covered by the Latimer Brook subregional basin (13% of the town) and a small portion is covered by the Oil Mill

Brook subregional basin of which both drain directly to Long Island Sound through the Southeast Western Complex.

2.3. Land Cover

According to the 2016 1-meter resolution land cover developed by the NOAA Office of Coastal Management, Montville is predominantly comprised of mixed forest, with approximately 68.37% of the town classified as such. The second largest land cover type is developed open space, which covers about 7.80%, and next is developed impervious which is about 6.71% of land cover. All land covers and their percent coverage can be found in Table 2-1.

Table 2-1 Town of Montville Land Cover

Land Cover Type (2016)	% Coverage
Barren Land	0.76
Cultivated Crops	0.31
Developed, Impervious	6.71
Developed, Open Space	7.80
Estuarine Emergent Wetland	<0.01
Estuarine Scrub/Shrub Wetland	<0.01
Grassland/Herbaceous	3.23
Mixed Forest	68.37
Open Water	5.28
Palustrine Aquatic Bed	0.41
Palustrine Emergent Wetland	0.48
Palustrine Forested Wetland	3.26
Palustrine Scrub/Shrub Wetland	0.33
Pasture Hay	1.28
Scrub/Shrub	2.00
Unconsolidated Shore	0.03

2.4. Population, Demographics, and Development Trends

As of the 2020 Decennial Census, the population for the town is 18,387, which equates to about 438 people per square mile. Montville was incorporated in 1786 from lands that were originally part of the North Parish of New London. The town includes the villages of Chesterfield, Mohegan, Oakdale, and Uncasville. Montville began its industrial history as a mill community and by the 1880s the Town had 15 cotton, woolen, and paper mills on the Oxoboxo River alone. The town has maintained a close relationship with the Mohegan Tribe which has established one of the largest casino destination resorts in the world located mostly adjacent to the northeastern section of Town. Today, the town maintains a combination of its industrial history with a large amount of undeveloped land spread largely across the western half of town. The town also maintains a suburban feel, as a majority of residents commute to the nearby larger Cities of Norwich or New London.

A buildout analysis in the *Plan of Conservation and Development* (POCD) (2010) considered building constraints including zoning regulations, slopes greater than 25 percent, wetlands, and floodplains. The

analysis showed that Montville has approximately 15,534 acres or 55% of its land area that is potentially available for future development. The buildout analysis mentions that this figure could include the 3,017 acres of managed open space, which would decrease the land area to 12,517 acres or approximately 44% of potentially developable land.

SCCOG data on land use collected in 2011 indicates that approximately 39% of town land is developed, 15% has been dedicated to open space, and 44% remains hypothetically open to development. This reflects an increase in development in recent years. Some of this change may be due to differences in data collection and land use designation between the UConn CLEAR program and SCCOG. For example, very low density residential is considered developed land by SCCOG, despite the fact that a large portion of each parcel may be open space.

Several developments have been recently completed, are underway, or are likely to be completed in the future:

- New, small subdivisions throughout town, though none in flood zones
- New multi-family developments have been proposed (2022)
- Village Apartments is adding 160 units, and will now total 217 units
- The Faria Mill, 42 Pink Row, is being redeveloped into 72 housing units. This location is in the Oxoboxo Brook flood zone

The housing stock in Montville consists primarily of single family homes. The above-mentioned projects include single and multi-family housing developments in Town. It is likely that Montville will continue to be a suburban community in the future, with the majority of its commercial and industrial development focused along I-395 and Route 32 in the eastern half of town.

Overall, most new development and redevelopment in Montville 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. The Faria Mill redevelopment, in particular, is requiring very careful design to ensure that the new uses will not increase flood risks.

The 2020 American Community Survey 5-year estimates identified the annual average median income for Montville to be $80,323, with an average of 22.05% of the population holding a Bachelor's Degree or higher, and an average unemployment rate of 6.5% throughout town.

2.5. Governmental Structure

Montville is governed by a Mayor and Town Council form of government. The authority of town officials is granted by Connecticut General Statutes. The Town Council is the legislative branch of the town and is responsible for the administration of town policies. The Mayor is the chief elected official and is responsible for the day-to-day administration of Montville.

The Town of Montville has boards, commissions, authorities and committees that can take an active role in hazard mitigation including the Emergency Management Department, the Inland Wetlands and

Watercourse Commission, the Planning and Zoning Commission, the Public Safety Commission, the Public Safety Building Committee, the Local Emergency Planning Committee and the Public Works/Solid Waste Standing Committee. Departments and commissions common to all municipalities in SCCOG were described in Section 2.9 of the Multi-Jurisdictional HMP. More specific information for different departments, commissions committees, authorities and boards of the Town of Montville is noted below:

- The Town of Montville is served by four volunteer fire companies which also provide ambulance services. A paid Fire Fighter/Emergency Medical Technician (EMT) is located at each station. The four stations include the Montville Fire Company at 77 Route 163, the Mohegan Fire Company at 2029 Norwich-New London Turnpike (Route 32), the Oakdale Fire Company at 444 Chapel Hill Road and the Chesterfield Company at 1606 Route 85.
- The Building Official is primarily responsible to perform plan reviews, issue permits and conduct inspections, issue orders to remove illegal or unsafe conditions, require the necessary safeguards during construction and demolition and to interpret and provide guidance regarding codes.
- The Planning and Zoning Commission works with the Planning Department staff to produce land use and zoning regulations. The commission consists of nine members who are appointed by the Town Council to serve for a four year term. The Commission contributes to the production of Zoning Regulations and mapping, the POCD and maps and site development guidelines.
- The Inland Wetlands Commission consists of seven members and two alternates who are appointed by the Town Council for a 4 year term. The commission works with the Planning Department to produce Inland Wetland Regulations and mapping and process wetlands permits while enforcing inland wetland regulations.
- The Public Works Department (PW) supervises and controls the maintenance of town-owned properties and parks. Additionally, the PW is responsible for the sweeping of roads, brush cutting on the side of roads, the preservation, care and removal of trees within highways or public places, cleaning of catch basins, paving, solid waste disposal and recycling.
- The Emergency Management Department ensures the public's well-being and safety during emergencies and disasters. The Department is responsible for maintaining the Town's Emergency Operations Plans (EOPs) and Hazardous Materials Plan in accordance with State mandates. The Department is integrated with the Local Emergency Planning Committee which currently consists of seven members.

The roles of Town commissions, committees, boards and departments have not changed since the time of the previous HMCAP. Thus, the Town of Montville 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

Montville 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 (2008), POCD (2010), Zoning Regulations, Subdivision Regulations and Inland Wetlands and Watercourses Regulations. The Zoning Regulations were revised to December 15, 2011, to incorporate new NFIP requirements associated with the DFIRM available on July 18, 2011.

Emergency Operations Plan

The town has an Emergency Operations Plan (EOP) that is updated and certified by the Mayor annually. This document provides general procedures to be instituted by the Mayor 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 (2022)

The POCD was most recently adopted in 2022 with contributions from local boards, commissions, committees, citizens and citizen groups. Planning staff report that updates and revisions have been adopted to that base plan since that time. 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 land uses and population densities in various parts of the municipality.

The 2010 POCD recommended the construction of a new Public Safety Building, the renovation of the Fair Oaks Community Center, the replacement of eleven bridges, the construction of a transfer station gate building, the replacement and upgrading of drainage networks, the construction of a sand and salt shed, develop a diverse housing stock long-term, incorporation of Low Impact Development (LID) practices, retention and attraction of businesses, and use of GIS to develop a commercial buildout study. The construction of a new Public Safety Building was completed in January 2013, and Police and dispatch personnel and resources were relocated there. The Fair Oaks Community Center has been renovated and now houses Montville Youth Services, and several bridges and culverts have been replaced. The town has made numerous strides in executing the 2010 recommendations.

The 2022 update of the Montville POCD has identified multiple actions and goals that are directly or indirectly tied to natural hazard mitigation. Many of these are flood related, however, some are related to emergency response, and future town development.

The 2022 Town of Montville POCD includes the following actions:

- Hazard mitigation goals:
    - Identify natural hazard areas and map on future land use maps
    - Adopt land use policies that encourage land protection within natural hazard areas and discourage development or redevelopment within natural hazard areas
    - Identify/incorporate an action to undertake an evacuation and shelter plan to deal with emergencies from natural hazards
    - Provide adequate space for expected future growth in areas outside of natural hazard areas
- Replace 10 bridges in town following the order of priority
- Analyze areas of drainage concern
- Produce a drainage constraints map as part of the Route 32/2A drainages constraints study
- Identify and purchase a location for a sand/salt shed
- Create online and in-person workshops that provide information on Watershed Protection

The Montville POCD is considered somewhat consistent with the current goals and actions of the hazard mitigation plan, although it does not directly address several of the hazards, or climate change. The next

comprehensive update to the POCD (scheduled for 2032) will continue to incorporate the elements of the hazard mitigation and climate adaptation plan.

Zoning Regulations (2022)

Montville's Zoning Regulations have been revised and updated to an effective date of November 15,2021. These regulations define substantial improvement as cumulative over the course of one year. The NFIP regulations for the Town of Montville are in Section 15.2 of the Zoning Regulations (effective 6/1/2011). New construction and substantial improvement must have the lowest floor elevated or floodproofed to or above the base flood level.

Coastal Area Management is addressed in section 15.3. Coastal Site Plans are required for all construction in the coastal zone.

The Montville Zoning Regulations require adequate ingress and egress for emergency vehicles, access to fire hydrants, other fire protection measures, and underground utilities in some zones.

Subdivision Regulations (2019)

The Subdivision Regulations are effective April 15, 2019. They discuss flooding considerations such as SFHAs and drainage networks in Section 5.8, and drainage infrastructure is discussed in many other locations within the Regulations.

Inland Wetlands and Watercourses Regulations (2017)

The Inland Wetlands and Watercourses Regulations in the Town of Montville require a permit for certain regulated activities that are within 50 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

Montville 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. The Chesterfield Fire Company is partially in the Zone AE Special Flood Hazard Area (SFHA), while the Montville Fire Company is partially in the 0.2 Percent Annual Chance floodplain. These facilities are described in more detail below.

Table 2-2 Town of Montville Critical Facilities

Facility	Address or Location	Emergency Power	Shelter	Cooling Center	In SFHA
Emergency Services					
Montville Fire Company	77 Route 163	✓			

Mohegan Fire Company	2029 Norwich-New London Tpke (Route 32)	✓			
Oakdale Fire Company	444 Chapel Hill Road	✓			
Chesterfield Fire Company	1606 Hartford-New London Tpke (Rt. 85)	✓			✓
Public Safety Building*	911 Norwich-New London Tpke (Rt. 32)	✓			
Municipal Facilities					
Town Hall**	310 Norwich-New London Tpke	✓		✓	
Montville High School	800 Old Colchester Road	✓	✓		
Leonard J. Tyl Middle School	166 Chesterfield Road	✓			
Public Works Building	225 Maple Avenue	✓			
Cook Drive Water Tank	Cook Drive				
Montville (Pink Row) WPCF	83 Pink Row	✓			
Killeen Road Substation	Killeen Road				
Montville Senior Center	12 Maple Avenue	✓		✓	
Special Communities					
Apple Rehab	5 Richard Brown Drive	✓			
Haughton Cove Manor	841 Norwich-New London Tpke	✓			
Independence Village Elderly Housing	Milefski Drive				
Freedom Village Elderly Housing	Liberty Road				
Jensen's Hillcrest Mini Estates (age 40+)	Old Colchester Road				
Other Infrastructure/Facilities					
Water & Wastewater Infrastructure	Various				

*Emergency Operations Center (EOC)

**Backup EOC

Fire Companies

Montville Fire Company – Montville Fire Company is comprised of 25 volunteer members with 12 EMTs and three emergency responders. The station has 10 fire trucks including rescue, engine and ladder types, two ambulances and at least two boats. MFC's oldest fire truck, which was originally built in 1931 was restored with money raised entirely by the fire department. There is always a full-time paid firefighter on duty at this location.

Mohegan Fire Company – The Mohegan Fire Company occupies the central location in Montville and holds two fire engines, a heavy rescue truck, a brush truck, two service vehicles, a boat and an ambulance. The station is made up of approximately 60 volunteers. The Company constructed a second building to the rear of the Fire Station this year and it is used by members for additional storage for apparatus, equipment and a work area.

Oakdale Fire Company – The Oakdale Fire Company is comprised of a main building and garage. Its apparatus includes an attack engine, an engine/rescue, a tanker, two pick-up trucks used as support for firefighting including wildland fires, a special operations vehicle used for chemical incidents, water rescue, and as a back-up for motor vehicle accidents. There is always a full-time paid firefighter on duty at this location.

Chesterfield Fire Company – The Chesterfield Fire Company has two fire engines, a rescue truck, a brush truck, a service truck, an ambulance and a Sports Utility Vehicle (SUV) for the Fire Chief. This Fire Company is staffed 40 hours per week.

SCCOG completed an assessment of critical facilities in the region in 2017, fulfilling an action listed in the 2012 edition of the multi-jurisdiction hazard mitigation plan. The Chesterfield Fire Company facility was addressed in this study. The assessment determined that the site is at low risk of riverine flooding, and risk reduction recommendations were not necessary.

Public Safety Building

Montville's Emergency Operations Center (EOC) is the Public Safety Building, completed in January 2013. The facility is an 18,000 square foot, approximately $6 million building located directly across the street from the State prison. The building houses the local police force and operates as the emergency dispatch center. It includes an emergency generator.

Police

Montville continues to operate under the auspices of the Resident State Trooper program, with the Mayor serving as the Town's Police Chief. A local force of 26 officers is supplemented by a Resident State Trooper. A local Police Lieutenant provides day-to-day oversight of administrative matters and scheduling of personnel, while the Resident State Trooper supervises the operational aspects of the department.

Montville's police and emergency dispatch services are based out of the Public Safety Building at 911 Norwich-New London Turnpike. Additionally, Connecticut State Police Troop E is based in Montville, on Interstate 395 south of Route 2A.

Public Works

The Public Works Facility has a generator and houses the town's fuel supply for vehicles and equipment.

Two Small Town Economic Assistance Program (STEAP) Grants have been approved for upgrades to the transfer station which will include realignment of the access and drainage improvements.

Town Hall

The Town Hall houses most of Montville's Town Departments and Officials which includes the Mayor, Planning Department, Zoning Enforcement Officer, Wetlands Agent, Building Department and Building Official, and Emergency Management Department and Emergency Management Director. The facility is fitted with a generator.

A variety of useful information pamphlets regarding disaster preparations are on display at Town Hall. These are focused on fire safety, fire prevention, evacuation procedures, evacuating people with special needs, and preparing disaster supply kits.

The Town Hall serves as a backup EOC. The Town Hall gym can also serve as a cooling center if necessary.

Communications and Shelters

The town's main shelter is the Montville High School. The facility is staffed by the American Red Cross (ARC) as needed, thereby being ARC-certified.

A regional shelter is located in East Lyme and is available for residents in the southwestern part of Town if the need arises. Residents would be sent to the regional shelter versus Tyl Middle School which used to be a secondary shelter.

In the event of an extreme heat event or heat wave, the town would open the Town Hall or Senior Center as designated cooling centers for residential use.

The Town's dispatch services are through the new Public Safety Building mentioned above. In recent years the Town has upgraded its communications towers, improving its internal emergency communication capabilities. Reverse 9-1-1 through the CT Alert "Everbridge" Emergency Notification System is available for town residents. Additionally, Town personnel post emergency alerts as needed to the Town website, on Public Access TV, and on the Facebook pages of different municipal departments.

Overall, the Town's capability to communicate with its residents, visitors, and businesses, as well as with outside emergency preparedness and response groups, has improved significantly since the previous HMP. Nevertheless, the Town is pursuing additional improvements through continued upgrades to communication infrastructure, as well as to more aggressive outreach campaigns to inform the public of hazard alert outlets. For example, the Town plans to more strongly encourage residents to sign up for the service via the CT Alert Emergency Notification System web site (http://www.ct.gov/ctalert/site/default.asp).

Special Communities and Other Types

The special communities in town include Apple Rehab with a bed capacity of approximately 130 beds, and the Haughton Cove Manor with approximately 12 beds. Both facilities have generators. Independence Village (40 units), Freedom Village (40 units) and Jensen's Hillcrest Mini Estates (Ages 40+) (150 units) have many residents that require oxygen. As a result, power outages in these areas are of concern. These are considered critical facilities. Jensen's has been approved for approximately 40 additional units.

Water and Wastewater

The "Pink Row" WPCF treats approximately four million gallons of residential, commercial and industrial wastewater per day which ultimately flows to the Thames River. In 2015 the entire facility was upgraded. A new emergency generator was installed.

Various water and wastewater facilities throughout town include the Cook Drive Tank (owned and operated by the Montville WPCA) and the Richard Brown Drive Tank (owned and operated by Norwich Public Utilities, or NPU). These are considered critical facilities.

Evacuation Routes

Annex E of Montville's EOP describes the town's evacuation plans. In Section V, under "Administration", the document states that the Evacuation Coordinator 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 Evacuation Coordinator is responsible for maintaining up-to-date evacuation route maps that depict designated primary and alternate evacuation routes.

Montville has several major routes of egress through Town. The largest volume transportation route through Town is Interstate 395 (I-395) which extends from the Town of Waterford near the village of Uncasville in the south northward to the City of Norwich to the north. Running almost parallel to I-395 to the east and extending from the village of Uncasville to the City of Norwich is Route 32 which is the second largest route of egress with a north-south orientation in Montville. Route 2A, which connects Route 12 in the Town of Preston to I-395 in Montville, is the largest volume route of egress with an east-west orientation in Town. Routes 163 and 82 are two major east-west oriented routes of egress in Town with Route 82 extending east-west across northern Montville and Route 163 extending from Route 32 near the Oxoboxo Brook in southeastern Montville northwest and into the Town of Bozrah in northwestern Montville. Additionally, Route 85 moves traffic from the Waterford town line to the west of Lake Konomoc northwest to the town line with the Town of Salem.

2.8. Repetitive Loss Properties

A repetitive loss (RL) 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. As of June 2022, the Town of Montville has two residential RL properties, with claim payments totaling $42,778.98.

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 Montville Exposure Analysis

Hazard	At-Risk Parcels		At-Risk Facilities		At-Risk Historic Assets	
	Value	Number	Value	Number	Value	Number
Hurricane/Tropical Storm	$1,374,247,330	7,224	$38,134,110	17	$8,045,100	8
Severe Thunderstorm	$1,374,247,330	7,224	$38,134,110	17	$8,045,100	8
Severe Winter Storm	$1,374,247,330	7,224	$38,134,110	17	$8,045,100	8

Tornado	$1,374,247,330	7,224	$38,134,110	17	$8,045,100	8
Drought	$886,197,870	4,477	$24,219,160	10	$664,510	3
Flood						
1% Annual Chance	$175,614,980	535	$5,894,070	4	$624,960	3
0.2% Annual Chance	$271,144,080	936	$7,884,940	7	$624,960	3
Storm Surge						
Category 1	$81,978,820	105	$4,808,020	3	$234,430	1
Category 2	$103,564,790	152	$4,808,020	3	$234,430	1
Category 3	$105,516,530	172	$4,808,020	3	$234,430	1
Category 4	$112,175,630	189	$4,808,020	3	$234,430	1
Earthquakes	$1,374,247,330	7,224	$38,134,110	17	$8,045,100	8
Wildfire	$673,287,730	3,629	$24,219,160	10	$664,510	3

2.10. Community Climate Change Challenges

As is with all of the SCCOG communities, the Town of Montville 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.

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 mean an increase in vulnerability risk throughout the town or for specific populations, more severe storm damage 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 0 of this annex. Wind hazards are widespread and can affect any part of Montville. However, some buildings in Town are more susceptible to wind damage than others.

The last major hurricane or tropical storm *wind* event to affect the town was associated with Tropical Storm Irene in August 2011. Branches and entire trees fell throughout the town and the region causing power outages that lasted up to seven days in Town.

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

[1] https://nca2018.globalchange.gov/chapter/2/

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 eight days. Montville staff report power outages in Town lasting up to a week. The Town of Montville received over $90,000 in disaster relief from FEMA to cover the cost of damages from the storm.

On August 2, 2020, Tropical Strom Isaias swept through the State brining 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.

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. Montville experienced flooding in some areas in town including Laurel Point Drive, Maple & Route 63, and Route 32. There was also a washout at Driscoll Drive.

3.2.2 Existing Capabilities

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, 2022. The code specifies the design wind speed for construction in all the Connecticut municipalities. The basic design wind speed for Montville ranges from 120 to 140 miles per hour, and the ultimate design wind speed is 125; speeds used vary 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. Montville has adopted the Connecticut Building Code as its building code.

Parts of trees (limbs) or entire tall and older trees may fall during heavy wind events, potentially damaging structures, utility lines, and vehicles. In Montville, the Public Works Director is the Tree Warden. In light of historic power outages and road blockage, The Town doubled its tree maintenance budget from $25 thousand to $50 thousand between 2015 and 2016. The Town contracts work as needed by an on call contractor.

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. Municipal staff report that Eversource has enhanced its tree clearing efforts along power lines, has updated its facilities, and has been working to strengthen the power grid and build in redundancies. Communication and coordination have improved due to Eversource’s liaison program. Municipal personnel expressed that Eversource has been very responsive and effective.

Montville personnel note that after a power outage, service is first restored to the Route 32 corridor. Blown-down debris is collected by the DPW and brought to a brush-disposal location that has been approved by the CT DEEP. Wood debris is ground to mulch at that site, and then made available to the public for reuse. The Town is required to inform CT DEEP before use of the disposal site. Agreements with landowners and companies are in place to chop/chip debris in case the DPW is overwhelmed by the volume.

The Town has language in its Subdivision Regulations requiring utilities and facilities to be located and constructed to minimize or eliminate flood damage, and to be buried underground in some zones. However, the Town does not have a specific regulation requiring that utilities be located underground in all new construction. Nevertheless, according to Town Officials, it is standard practice to place utilities underground in new subdivisions. It is either prohibitively expensive or not feasible to place existing utilities underground in many areas of town because these areas are underlain by shallow bedrock.

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 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. Commercial building owners are encouraged to develop emergency response plans and to identify mitigation opportunities through the Chamber of Commerce, as well as through regional SCCOG programs.

Residents are currently able to sign up to receive warnings from the CT Alert "Everbridge" Emergency Notification System to receive critical information specific to different areas within Montville. Although hurricanes that have impacted Montville 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.

Information on wind-resistant construction techniques is available to all permit applicants upon request, and wind-resistance requirements are enforced through the State Building Code.

Summary

In general, municipal capabilities to mitigate hurricane damage have not increased significantly since the 2017 edition of the hazard mitigation plan was adopted. This is likely because the Town increased its capabilities in response to the winds of Tropical Storm Irene in 2011 and Super Storm Sandy in 2012, and has continued to operate at this level.

3.2.3 Vulnerabilities and Risk Assessment

All of Montville 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 0). Of particular concern are the blockage of roads and the damage to the electrical power supply from falling trees and tree limbs. As mentioned, there was a town-wide seven day power outage following Tropical Storm Irene in 2011 due to tree damage to utility lines.

Many structures built in Town do not meet current wind load 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.

The damage of a hurricane could cause a moderate economic impact to Montville. The potential economic effect of wind damage to SCCOG was evaluated in the Multi-Jurisdictional HMP. A separate analysis was not performed specifically for Montville.

3.2.3.1 Hazard Losses

The Town of Montville did not receive FEMA PA funds in the wake of Tropical Storm Isaias. Since 2012, the town has received $92,079 in FEMA PA funds for project costs of $122,772. This was all received for Hurricane Sandy. These funds were received for debris removal and protective measures.

In addition to PA funds, FEMA offers property owners and renters Individual Assistance (IA) funds in the event of declared disasters. In the wake of Hurricane Ida, 14 property owners received IA funds in the amount of $39,532.

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 3-3presents hurricane related damages for the Town of Montville. 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

Montville	Return Period	Residential	Commercial	Industrial	Others	Total
	10-year	$25,550	$0	$0	$0	$25,550
	20-year	$1,720,250	$86,470	$14,840	$34,400	$1,855,960
	50-year	$10,453,340	$1,038,810	$180,670	$323,220	$11,996,040
	100-year	$21,745,540	$3,148,290	$673,390	$1,611,820	$27,179,040
	200-year	$40,677,930	$7,361,340	$1,811,850	$4,099,270	$53,950,390
	500-year	$81,568,850	$16,477,560	$4,390,700	$8,645,080	$111,082,190
	1,000-year	$125,095,290	$25,982,310	$7,099,970	$12,803,630	$170,981,200

Table 3-2 HAZUS=MH Hurricane Related Building Damage

Montville	Return Period	Minor	Moderate	Severe	Destruction	Total
	10-year	3	0	0	0	3
	20-year	20	1	0	0	21
	50-year	275	25	0	0	300
	100-year	690	89	3	1	783
	200-year	1,163	220	13	7	1,403
	500-year	1,700	469	50	28	2,247
	1,000-year	1,976	678	101	56	2,811

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

Montville	Return Period	Debris Generated (Tons)	Households Displaced	Individuals Seeking Temporary Shelter
	10-year	2	0	0
	20-year	182	0	0
	50-year	2,802	0	0
	100-year	4,744	1	0
	200-year	8,334	9	4
	500-year	15,279	34	12
	1,000-year	21,605	73	25

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 section of Montville. 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 summer 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 2017 edition of the HMP, however several strong thunderstorms have occurred.

Some of the significant recent severe storm events include:

- On September 6, 2017, a cold front triggered severe storms in the county and caused tree damage in multiple communities in the region. Nearby 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 Pawcatuck, and another 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.

The town reports that power outages are still a challenge in town, with several extended outages having occurred in the past few years. It appears that there is a lack of redundancies for long transmission lines. It appears there is “one circuit in, one out” for the town therefore making rerouting and restoration a challenge.

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 National Weather Service 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 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

In general, municipal capabilities to mitigate thunderstorm and tornado damage have not increased significantly since the 2017 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 summer 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 mph. Experience has generally shown that wind in excess of 50 miles per hour (mph) will cause significant tree damage during the summer season as the effects of wind on trees are 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.

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 least frequent in New London County as compared with the rest of 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

Since 2017, there has been no NOAA reported events associated with a severe thunderstorm and wind event. Since 2012 there has been one hail event and one wind event reported, with damages totaling $7,500 for the wind event; no damages were reported for the hail 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.

Winter storms and nor'easters have affected the town as reported to the NCDC and reported by Town Officials. In particular, the winter storms of 2010-2011 had a significant effect on Montville due to the significant snowfall:

- At the St. Thomas More School cafeteria in the Oakdale village of Montville, the roof was heard making noises due to strain, so the facility was evacuated, and the roof was cleared.
- At the Stop and Shop supermarket, steel wall studs lost flex and sheetrock cracked and the store was shut down while the roof was cleared.
- A few businesses in Montville cleared their own roofs and the Montville Public Schools all cleared their own roofs.
- A residence on Laurel Point Road was evacuated but did not fail.
- Some mobile homes suffered damage to overhangs.
- Winter Storm Alfred in late October 2011 produced heavy snow to only the northwest part of Town as the southeast section did not receive any snow. This was partly due to the significant change in elevation in Town which ranges from around 600 feet to sea level, resulting in microclimate effects.

  Winter storms and nor'easters have affected the town since the 2012 edition of the HMP as well:
- 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. Montville reported power outages that lasted up to one week after Winter Storm Nemo.
- The winter of 2015 also saw a series of significant snow events that lead to major snow loading to roofs. In Montville, the roof of Montview Apartments collapsed, requiring relocation of residents at significant Town expense. A private barn also collapsed under the load.

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. The public assistance reimbursement for the February 2013 storm was $110,017.

Some of the more recent significant winter events include:

- A heavy storm came through the region on February 9, 2017, bringing blizzard conditions and heavy snowfall. The Town of 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 by 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.

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. This specification is adhered to by the Town.

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.

The Public Works Department oversees snow removal in the town. The Connecticut Department of Transportation (DOT) plows the State roadways, while the town employs 21 plow trucks that navigate 140 miles of Town roads. The Public Works Director assigns routes and routes are prioritized. The Public Works Director does not maintain a map or list due to potential liability issues, as past experiences have brought this issue to the surface. The PWD identifies areas that are difficult to access during winter storm events and assists with emergency access to those areas as needed.

The Board of Education and the Department of Public Works coordinate a roof monitoring plan for municipal and school building roofs. The Town participated in a statewide ice storm drill from October 29 to November 2, 2016, demonstrating its ability to participate in such exercises. Information about protecting residents during cold weather, such as mitigating icing and insulating pipes, is posted on the Facebook pages of municipal departments when such weather is expected.

Summary

In general, municipal capabilities to mitigate snowstorm damage have increased slightly since the 2017 edition of the hazard mitigation plan was adopted. This is because the Town continues to experience heavy snow each winter.

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.

There are a significant number of steep slopes such that extra sanding and salting of the roadways is instrumental in locations and are prioritized to alleviate the most troublesome locations first. Although

Town Officials did not note that steep slopes are a major issue in Town, high traffic volume roadways with steep slopes should be given high priority when Town staff begins roadway treatment. This is usually the case.

3.4.3.1 Hazard Losses

There have been no reported winter storm losses for the Town of Montville since 2017. In the past decade, the city has received FEMA PA funds in the amount of $236,395 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, but also characterizes 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 (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).

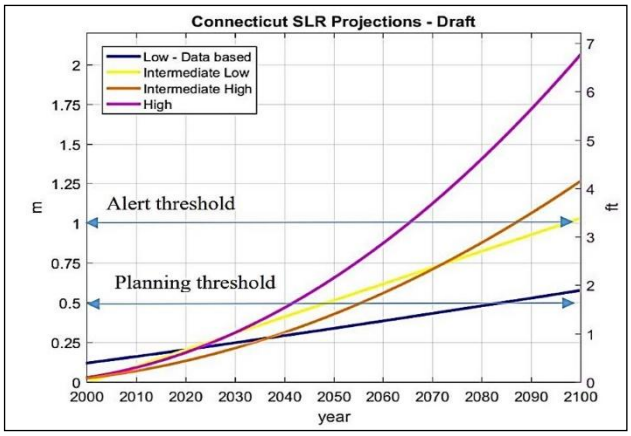

Figure 4-1 Four Localized Sea Level Rise Scenarios for

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 mean 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/Historic Record

Despite being located inland from the Connecticut shoreline, the Town of Montville has coastal resource areas that are tidally influenced along the Thames River. The shoreline of Montville contains a combination of undeveloped and developed shorefront with estuarine embayments at Horton Cove,

Bartlett Cove, Smith Cove, and elsewhere. The coastal resources found in Connecticut and described by DEEP are listed in the Multi-Jurisdictional HMP.

Homes, businesses, and industry are located in close proximity to the shorefront along the coastal area. However, the Town's inland location places many properties at higher elevations than typical coastal low-lying areas adjacent to Long Island Sound. As such, the town does not typically experience coastal flooding. While coastal flooding is relatively infrequent, hurricanes and tropical storms have the potential to induce coastal flooding and storm surge that can impact structures.

The last major hurricane or tropical storm wind event to affect the Town was Hurricane Sandy in October 2012. Sandy brought high winds and coastal flooding to the entire Connecticut coastline. However, no significant coastal flooding occurred within Montville along the tidal Thames River. However, the Town may be concerned with the potential long-term effects of sea level rise and its potential to exacerbate coastal flooding conditions in the future.

4.2.2 Existing Capabilities

Montville primarily attempts to mitigate coastal flood damage and flood hazards by controlling and restricting activities in floodprone areas and the coastal management area, maintaining hard structures in good condition, and providing signage and warning systems. Many of the Existing Capabilities utilized in the Town for inland flood mitigation (Section 5.2.2) are also applicable to coastal flood mitigation, and additional programs were listed in Section 2.6.

The shoreline of Montville contains many flood and erosion control structures. Private bulkheads can be found in many of the residentially, commercially and industrially developed coastal neighborhoods. The Richards Grove neighborhood is a good example of residential properties with shoreline protection structures. The shorelines of the NRG facility and the neighboring industrial facilities are developed with riprap and bulkheads. The railroad line that runs almost parallel to Route 32 forms an embankment along parts of the Thames shoreline. In particular, the railroad embankment separates Smith Cove and Horton Cove from the Thames River.

As noted in Section 5.2.2 and Section 2.6, the town utilizes the Special Flood Hazard Areas delineated by FEMA. These consist of the 1% annual chance floodplain with elevations (Zone AE) including floodway areas. As noted by the Zoning Regulations, building activities in the floodplain are restricted and new construction or substantial redevelopment must prove that the lowest horizontal member of the new construction will be above the base flood elevation. In addition, the town requires the submission of a coastal site plan for any project located within the coastal area management boundary.

Like many communities, the Town lacks existing policies and mitigation measures that are specifically designed to address sea level rise. The Town participated in a resiliency planning initiative with SCCOG and TNC in 2016-2017[2]. However, the Town has not yet embarked on detailed coastal hazard planning to the degree that nearby communities like Waterford and the Town of Groton have done. Although the Town does not currently have a specific plan to address sea level rise, important pieces are in place in the form of the codes and regulations cited in this HMCAP that have been enacted to minimize storm, erosion, and flood damage to structures.

[2] https://tnc.app.box.com/s/8nne60yjk2g3m1mgzkfa86rndxyjiawf

Summary

In general, municipal capabilities to mitigate coastal flood damage have remained flat since the 2017 edition of the hazard mitigation plan was adopted. This is likely because the coastal flood risks are minimal along the tidal portion of the Thames River. However, the Town must continue to monitor changes occurring along the Thames River and plan accordingly.

4.2.3 Vulnerabilities and Risk Assessment

This section discusses specific areas at risk of coastal flooding within Montville. This flooding can be the result of astronomical high tides, hurricanes, nor'easters, or storm surge. Historic record coastal flooding typically only occurs due to storm surge. Refer to Figure 4-2 for a depiction of areas susceptible to storm surge.

Vulnerability Analysis of Areas along Coastal Waters

The area potentially flooded by storm surge is not as extensive as the SFHA floodplain. In general, the coastal area affected by storm surge is limited to areas immediately adjacent to the Thames River.

In general, it is assumed that as sea level rises, the frequency and magnitude of coastal flooding in the town will increase, with structures and roadways closest to existing sea level being affected the quickest.

Vulnerability Analysis of Private Properties

The coastal areas of the Town of Montville have properties that are inhabited year-round. This intensifies risk to life and property in coastal areas. Waterfront properties are very susceptible to damage from storm surge although FEMA has not established any coastal velocity zones in Montville.

Buildings located in flood hazard areas are primarily commercial or industrial but also include some residential and critical facility structures as noted in Section 5.2.3. Most of the structures that are threatened by flooding are also located within a SFHA.

Vulnerability Analysis of Critical Facilities

As shown on Figure 4-2, most of the critical facilities are not located within potential storm surge areas or coastal flood risk areas.

4.2.3.1 Hazard Losses

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

Figure 4-2 Town of Montville Hurricane Surge Zones

4.3. Shoreline Change

4.3.1 Setting/Historic Record

Shoreline change is primarily a natural process caused by wind, waves, and currents, however it can also be attributed to human driven processes such as development, grading, and beach armoring or nourishment. As climate change impacts hazards such as severe storms, hurricanes and tropical storms, and sea level rise, shorelines have the potential to change at different rates than in decades past. As tidal ranges increase, and storm surge becomes higher and potentially more intense, these processes may become exacerbated. Rapidly changing shorelines can have an impact on coastal ecosystem (particularly those that provide natural buffers), erode natural shorelines resulting in encroaching seas onto developed land, and may alter those shorelines that have been hardened to protect development and infrastructure.

4.3.2 Existing Capabilities

As discussed above in Section 4.2.2, the Town works to mitigate coastal damage or shoreline change by controlling activities in these floodprone areas. There are also several flood and erosion control structures that protect certain properties in the vulnerable areas. These structures, however, could also be changing the shoreline in front of the structure in an unnatural or expedited way.

The town also utilizes the FEMA Special Flood Hazard Areas, which helps to limit certain building activities in coastal areas prone to erosion and change. The coastal site plan review, which is required for projects within the coastal area management boundary, is also an important tool for monitoring development in these areas.

4.3.3 Vulnerabilities and Risk Assessment

Coastal erosion is generally not an issue in the Town of Montville since much of the shorefront is either fully developed (particularly along the NRG facility and adjacent industrial facilities) or characterized by elevated bedrock. However, as sea level rises, the effectiveness of these structures could be undermined such that erosion will be able to occur landward of riprap, bulkheads, and embankments, thus necessitating expansion of the structures.

4.3.3.1 Hazard Losses

There are no reported losses for the Town of Montville 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, damage 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 HMP. While riverine flooding is of primary concern, most issues in town fall under nuisance flooding or poor drainage classification. 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 typical than damage to structures in the Town of Montville.

The March 2010 storms continue to be considered the event that caused the most widespread flooding in Montville since the town began participating in the multi-jurisdiction hazard mitigation plan. These flood events caused basement flooding, roadway flooding, and a significant amount of nuisance flooding. Flooding via poor drainage remains Montville's primary concern.

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

Hurricane Ida, which produced several inches of rain across the state, flooded multiple roads in town, and caused a washout on Driscoll Drive. Roadways that flooded included Laurel Point Drive, Maple & Route 63, and Route 32. A total of 8.58 inches of rain reportedly fell in Uncasville, and 6.78 inches in neighboring Salem.

After a period of prolonged drought, a severe rainstorm event on September 5/6, 2022, caused flooding in some areas of the region. 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 floodprone areas, replacing bridges and culverts, promoting flood insurance, maintaining drainage systems, through education and outreach, and by utilizing warning systems. These mitigation measures are budget-dependent. Many mitigation measures are common to all hazards and therefore were listed in Section 2.6. No structural flood control projects are located within or upstream of Montville, although some of the existing dams provide a small amount of flood mitigation.

Bridge Replacements, Drainage, and Maintenance

The Public Works Department 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 any of the four Fire Companies and/or Fire Marshal 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.

Since the previous HMP, the following bridge, drainage, and infrastructure projects have been completed:

- The Old Colchester Road culvert bridge adjacent to the Community Center was replaced
- The Department of Public Works adopted a Pavement Management System
- The Town adopted new Road Standards
- Low Impact Development (LID) has been incorporated into the project and site plan review

These projects are evidence of Montville's strong bridge and culvert repair and upgrade program.

Regulations, Codes, and Ordinances

Montville has planning and zoning tools in place that incorporate floodplain management and allow the Town to regulate new development activities within SFHAs. The Town's Subdivision Regulations require adequate drainage be provided to reduce exposure to flood hazards; they do not require demonstration of whether detention or retention of stormwater is the best option for reducing peak flows downstream, but case-by-case assessment of site plans addresses this as needed. The Subdivision Regulations also incorporate floodplain management. Inland Wetlands and Watercourses Regulations cover development in and/or near inland wetland areas.

The Town continually reviews and updates its regulations based on local needs and state and federal requirements. This includes incorporating up-to-date practices regarding sea level rise.

Acquisitions, Elevations, and Property Protection

Montville acquired 29.32 acres of land adjacent to Camp Oakdale to provide more active and passive recreational property. Though the property is not in the SFHA, it does contain a small pond and Oxoboxo Brook tributary.

Flood Watches and Warnings

The Mayor and the Fire Companies access weather reports through the National Weather Service and local media. In addition, Montville participates in the CT Alerts "Everbridge" Emergency Alerting and Notification Reverse 9-1-1 System which provides the town the ability to telephone weather warnings into geographically specific areas when storms are imminent.

Public Education and Information

The Town has FEMA flood insurance and other flood-hazard information brochures available at the Town Hall. If approached by residents and property owners, the Town will encourage the purchase of flood insurance, and the submittal of flood insurance claims following an event. Technical assistance regarding flood proofing techniques can be provided by the building official as needed.

Summary

In general, municipal capabilities to mitigate flood damage have increased slightly since the 2017 edition of the hazard mitigation plan was adopted. This is because the Town has continued to make investments in reviewing development proposals and constructing public works projects.

5.2.3 Vulnerabilities and Risk Assessment

This section discusses specific areas at risk of inland flooding within Montville.

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 Thames River and those watercourses discussed below.

Vulnerability Analysis of Areas along Watercourses

Parts of the Latimer Brook, Oxoboxo Brook, Trading Cove Brook, the Thames River, Deep Hollow Brook, Hunts Brook, Bogue Brook, Sandy Brook, Fox Brook, Neck Brook, Falls Brook and Stony Brook all have a Special Flood Hazard Area (SFHA) associated with them. Sections of Latimer Brook, Oxoboxo Brook, Trading Cove Brook and the Thames River 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. As previously discussed, there are a few areas of town where flooding is hazardous to residents, buildings, or roadways. Those areas are discussed in Section 5.2.1 and listed below; refer to Figure 5-2 for the location of SFHAs within Montville:

- Laurel Point Drive near Oxoboxo Lake floods every year due to poor drainage in the area.

- Maple Avenue near the Town Hall floods annually, and water inundates the road. Wetlands are located on both sides of the road, and it is possible that Route 163 road work contributes to the flooding on the street.
- According to officials, Fitch Hill Road at Old Fitch Hill Road appears to be drainage-related flooding.
- Faria Marine Instruments at 385 Norwich – New London Turnpike was located at the end of the Oxoboxo Brook system, and the basement was repeatedly flooded. This property has been purchased by a new owner since the 2012 edition of the HMP and will have a new use. A dam on the property has been sold to Picker Pond LLC, which is exploring removing the dam; this may diminish flood risk.
- The basements of Countryside Condominiums are constantly inundated. The flooding is related to poor drainage, and it is noted by Town Officials that the land between the condominiums and the school is often wet.
- The Repetitive Loss Property (RLP) on Lake Drive East may experience basement flooding. It appears that the home has a walk-out basement in the rear with wetlands behind.

Figure 5-1 CCVI Flood Vulnerability for the Town of Montville

Montville has several major transportation routes. The largest volume transportation route through Town is Interstate 395 (I-395) which extends from the Town of Waterford near the village of Uncasville in the south northward to the City of Norwich to the north. Running almost parallel to I-395 to the east and extending from the village of Uncasville to the City of Norwich is Route 32 which is the second largest route of egress with a north-south orientation in Montville. Route 2A, which connects Route 12 in the Town of Preston to Interstate 395 in Montville, is the largest volume route of egress with an east-west orientation in Town.

In addition, Route 163 and Route 82 are two major east-west oriented routes of egress in Town with Route 82 extending east-west across northern Montville and Route 163 extending from Route 32 near the Oxoboxo River in southeastern Montville northwest and into the Town of Bozrah in northwestern Montville. Additionally, Route 85 moves traffic from the Waterford town line to the west of Lake Konomoc northwest to the town line with the Town of Salem.

The DFIRM mapping suggests that these transportation routes can be negatively affected by extreme flooding. The DFIRM mapping shows FEMA flood zones stretching across I-395 and Routes 32, 2A, 12, 163, 82 and 85 at different areas. It is understood that some of these are mapped where culverts cross these routes and may not be affected. However, some culverts may be undersized or somehow inundate the roadway another way. According to town officials, the most problematic areas of flooding associated with transportation through town are sections of Routes 32 and 163 described above.

Vulnerability Analysis of Private Properties

The majority of structures at risk of flooding are located along Oxoboxo Brook, near Horton Cove and in close proximity along the Thames River. Structures include residential, commercial and industrial with residential structures accounting for the majority.

Town personnel indicate that structures typically do not get flooded in Montville due to riverine or overbank flood conditions, despite their locations in SFHAs. As shown in the table of the Multi-Jurisdictional HMP, there are two repetitive loss properties in town. One property is located along Oxoboxo Lake and one is nearby. Repetitive Loss Properties are those which have received two or more claim payments of more than $1,000 from the NFIP within any rolling 10-year period for the home or business.

Figure 5-2 Town of Montville FEMA Special Flood Hazard Areas

As noted in Section 2.7 one of the critical facilities, the Chesterfield Fire Company is located immediately adjacent to a SFHA flood zone while the Montville Fire Company is located adjacent to the 0.2 Percent Annual Chance floodplain. With respect to critical facilities, these two locations have been of some concern to the Town in conjunction with flooding.

SCCOG completed an assessment of critical facilities in the region in 2017, fulfilling an action listed in the 2012 edition of the multi-jurisdiction hazard mitigation plan. The Chesterfield Fire Company facility was addressed in this study. The assessment determined that the site is at low risk of riverine flooding, and risk reduction recommendations were not necessary. The Montville Fire Company was not included in the critical facilities assessment, since the site is outside the flood zone. However, the roadway in front of the facility is in the 0.2% annual chance flood zone and the Town should continue to monitor risks.

Montville Personal note a Brownfield site at 14 Bridge Street, adjacent to Oxoboxo Brook, as at risk of flooding. A Brownfield Remediation project has been approved at this site, and the effects that project will have on stormwater will be considered.

5.2.3.1 Hazard Losses

According to NFIP statistics, as of June 30, 2022, the Town of Montville has had a total of 15 flood related losses, with a total of $71,819 paid towards the claims.

Since 2017 there have been zero NOAA reported flood or flash flood events. Since 2012 there have been two flash flood events with no reported damages.

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 Montville. 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

Montville	2022 Results				
	Residential	Commercial	Industrial	Other	Total
Direct					
Building	$1,800,000	$420,000	$80,000	$20,000	$2,320,000
Contents	$860,000	$1,170,000	$160,000	$100,000	$2,290,000
Inventory	$0	$710,000	$30,000	$0	$740,000
Subtotal	$2,660,000	$2,300,000	$270,000	$120,000	$5,350,000
Business Interruption					
Income	$760,000	$1,420,000	$10,000	$40,000	$2,230,000
Relocation	$1,190,000	$570,000	$0	$10,000	$1,770,000
Rental Income	$1,690,000	$420,000	$0	$0	$2,110,000
Wage	$1,790,000	$1,140,000	$10,000	$1,130,000	$4,070,000
Subtotal	$5,430,000	$3,550,000	$20,000	$1,180,000	$10,180,000
Total	**$8,090,000**	**$5,850,000**	**$290,000**	**$1,300,000**	**$15,530,000**

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 being 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 was in an ongoing drought, with severe drought conditions in August 2022. New London County was declared a Stage 3 drought emergency on August 18, 2022.

5.3.2 Existing Capabilities

The Town of Montville, like many communities, does not have specific regulations geared toward drought mitigation. One of the main purposes of the City's zoning regulations is however to facilitate the adequate provision of water throughout the town, encourage the most appropriate use of the land, and for reasonable consideration for the protection of existing and potential public surface and ground drinking water supplies. These purposes, when executed smartly, can all help to mitigate the impacts of drought and maintain healthy groundwater supplies.

In Section 16.3 of the Zoning Regulations, the protection of surface and groundwater supply is taken into consideration during the site plan review, with this section outlining the evaluation minimum. The Commission shall consider any developmental impacts on drinking water supplies and has the ability to deny an application if adverse impacts will result from the granting of a special permit.

The U.S. Drought Monitor is a national resource that many state and local entities use to monitor regional conditions in relation to drought development. The weekly reporting issued by the partnership includes a drought intensity scale which includes five stages from "abnormally dry" to "exceptional drought". While this resource is available to Town for determining drought conditions, the Connecticut Interagency Drought Workgroup (IDW) uses this and other resources to monitor drought conditions specifically for the state. The Town of Montville has this IDW and state-specific drought emergency declarations as a resource to prepare for, and respond to, droughts.

5.3.3 Vulnerabilities and Risk Assessment

The entire Town of Montville is vulnerable to drought, but the degree of vulnerability varies. A majority of the properties in town rely on private wells for their residential or commercial drinking water. These private well users may face challenges relative to water supply during periods of drought. The number of

private wells, and their vulnerability, is a concern to the town. The town reports that many of the wells in town are shallow/hand dug wells that are vulnerable to drying up. For example, Oxoboxo Lake was drained years ago for dam repairs and many of the residents surrounding the lake experienced wells running dry. The town feels there is a need for more access to public water systems in Town.

5.3.3.1 Hazard Losses

There have been no reported drought losses for the Town of Montville. 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 Montville is considered a possible event each year with potentially devastating effects. The Rockland Pond Dam nearly overtopped during the storms of March 2010, and the section of Montville downstream of the Rockland Pond Dam was evacuated when it became possible that the dam would breach. Repairs were recently made to this dam. Additionally, the Oxoboxo Lake Dam owned by Stone Container was grouted and repaired several years ago. Despite these incidents and repairs, no dam failures have affected the town since the time of the last HMP.

5.4.2 Existing Capabilities

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. As noted in the Multi-Jurisdictional HMP, Montville is home to six Class BB (moderate hazard), three Class B (significant hazard) dams, and one Class C (high hazard) dam.

All registered dams in the Town of Montville are listed in Table 5-2. No Class B or Class C dams are located upstream of Montville whose failure could potentially lead to flooding within the Town.

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

CT Dam#	Dam Name	Dam Class	Owner Type
8631	Deep Hollow Brook Dam	A	Private
8633	Sideline Pond Dam	A	Private
8612	New London Pond Dam	A	Private
8620	Aqua Pond Dam	A	Private
8621	Silver Falls Pond Dam	A	Private
8623	Parish Pond Dam	A	Private Corporation
8624	Mcalpine Brook Dam	A	Private
8625	Amoeba Pond Dam	A	Private
8628	Sharp Pond Dam	A	Private

8630	Fire Street Pond Dam	A	Private
8637	Little Creek Dam	A	Private
8601	Congdon Pond Dam	B	Private Corporation
8607	Wheeler Pond Dam	B	Private
8613	Rockland Pond Dam	B	Private Corporation
8608	Gay Cemetery Pond Dam	BB	Private Corporation
8609	Brodie Pond Dam	BB	Private
8610	Red Mill Pond Dam	BB	Private Corporation
8611	Schofield Pond Dam	BB	Private
8614	Mohegan Brook Dam	BB	Private Corporation
8615	Oakdale Pond Dam	BB	Private
8606	Oxoboxo Lake Dam	C	Private Corporation

Dams in the region whose failure could impact Montville are under the jurisdiction of the Connecticut DEEP. 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 Town of Montville does not own any dams. Some of the EAPs for the Class B or Class C dams were on file at DEEP when conducting a Dam Safety file review. The dam failure inundation area for the Stony Brook Reservoir Dam was updated in accordance with changes to dam safety regulations and incorporated into a revised EAP in 2015.

EAPs are on file with the Montville Emergency Management Director for the Oxoboxo/Stone Container dam, Rand Whitney, and Stony Brook Reservoir. During the March 2010 flood, the DEEP reportedly notified the Town to "follow the EOPs" on file as necessary. The Town should continue working with the DEEP and dam owners to ensure that all EAPs remain current and on file.

Prior to potential hazard events such as hurricanes or predicted large rainfall events, the Town calls dam owners and invites them to pre-event planning meetings. This is a noteworthy practice that should continue to be implemented. Upon request, the Town also provides assistance to the owners of lesser ranked dams regarding resources available for inspections and maintenance.

Summary

In general, municipal capabilities to mitigate dam failure damage have not increased significantly since the 2017 edition of the hazard mitigation plan was adopted. In addition, changes in the State's regulation of dams have increased Statewide capabilities sharply.

5.4.3 Vulnerabilities and Risk Assessment

The potential impacts related to the failure of Class B dams within Montville are described below. The descriptions below are based on information available at the Connecticut DEEP Dam Safety Section. Refer to Figure 5-3 for a location map showing the dams and potential dam failure inundation areas (where available).

- Congdon Pond Dam is a Class B dam located on Oxoboxo Brook. The dam has a stone masonry overflow spillway and two earth embankment sections. Earth embankment sections are approximately 35 feet high and are faced with stone masonry on both upstream and downstream sides with the facing nearly vertical. The crest is variable in width with the right embankment higher than the left. The total length of the dam is 150 feet including the spillway which is 50 feet in length.

  Although dam failure inundation area mapping was not found during the review of DEEP Dam Safety Section records, it was described in text. Failure to the dam could result in the loss of life and damage to seven to 10 dwellings and one to three commercial properties. Flooding and potential damage may also occur to Darrow Road as well as public utilities within the right-of-way. Damage may also occur to a double-barreled concrete arch bridge located 260 feet downstream of the dam and the failure will likely cause high velocity flows that will carry trees, vegetation and other debris that will increase damage potential. In August of 2001, an inspection noted that the dam was in "fair" condition.

- Bogue Brook Reservoir Dam is a Class B dam located at the west end of the Bogue Brook Reservoir, approximately 950 feet upstream of the Chesterfield Road crossing of Bogue Brook. A letter dated January 15, 2003 (from Karl Acimovic on behalf of the owner) to the CT DEEP states that the dam is an Ambursen design consisting of a thin-shell concrete structure buttressed by intermittent vertical panels. The letter also notes that the dam is currently stable and in relatively fair to good condition and that seepage at several points and hairline fractures make it look worse. According to the USACE inspection report online, the dam was completed in 1920 and the reservoir is used for water supply. The dam is a concrete structure with a length of 200 feet and a height of 22 feet. The drainage area to the reservoir is 1.7 square miles with the maximum storage being 684 acre-feet and the maximum discharge being 513 cubic feet per second (cfs). The dam failure inundation area mapping was not found on record.
- Oxoboxo Lake Dam is a Class C dam located on Oxoboxo Brook at the southeast end of Oxoboxo Lake. According to the USACE inspection report online, the dam was completed in 1810, has a length of 166 feet, and a height of 26 feet. The drainage area to the lake is 3.29 square miles, the maximum storage is 2,573 acre-feet, and the maximum discharge is 400 cfs. The lake is used for recreation. The dam failure inundation mapping was not found on record at the DEEP.
- Wheeler Pond Dam is a Class B dam located on Oxoboxo Brook at the southeast end of Wheeler Pond. According to the USACE inspection report online, the dam was completed in 1810 and is a concrete structure with a length of 54 feet and a height of 20 feet. The drainage area to the pond is 9.09 square miles and the maximum storage is 1,276 acre-feet, while the maximum discharge is 934 cfs. The report does not specify the purpose of the dam and impoundment. The dam failure inundation mapping was not found on record at the DEEP.
- Red Mill Pond Dam is a Class BB dam located on Oxoboxo Brook at the southeast end of Red Mill Pond. No files, including dam failure inundation mapping, were found on record at the DEEP.
- Rockland Pond Dam is a Class B dam located on Oxoboxo Brook at the southeast end of Rockland Pond. According to the USACE inspection report online, the dam was completed in 1900, has a length of 133 feet, and a height of 10 feet. The drainage area to the pond is 9.7 square miles, the maximum storage is 92 acre-feet, and the maximum discharge is 870 cfs. The

report does not specify the purpose of the dam and impoundment. Dam failure inundation mapping was not found on record at the DEEP.

- Stony Brook Reservoir Dam is a Class B dam located on Stony Brook. The most recent dam inspection was completed by Milone & MacBroom, Inc. in 2014, and an EOP was developed with a publication date of 2015. A new EAP was developed in accordance with new DEEP guidance, in 2017-2018. The Stony Brook dam consists of a main earthen embankment dam on the right side of the impoundment and a second earthen dam with concrete spillway on the left side of the impoundment. The main dam earthen embankment was in good condition. The downstream face of the embankment has very steep side slopes. The embankment is covered with light vegetation that is mowed on a regular basis. Riprap has been placed along the downstream toe. The upstream face is entirely rip rapped. A gate house is located off the upstream face of the embankment near the left side of the impoundment. The spillway was in very good condition. It is comprised of concrete training walls, a concrete floor, and a single concrete pier supporting a timber bridge that passes over the spillway. The spillway is outfitted with an inflatable rubber dam in very good condition.

5.4.3.1 Hazard Losses

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

Figure 5-3 Dams Registered with DEEP in the Town of Montville

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 experienced 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/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 are 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 are above 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
GNL = Groton New London station & NPU = Norwich Public Utilities station										

[3] https://nca201758.globalchange.gov/chapter/2/

6.2.2 Existing Capabilities

Similar to the monitoring methods used for hurricanes, severe storms, and winter storms, the Town monitors National Weather Service and local forecasts for anticipated extreme heat event, and also monitors for NWS heat warnings and advisories. The Town of Montville has identified the Senior Center, and the gym at the Town Hallas cooling centers in town, though the Senior Center does have limited capacity. It was also noted that the casino can also function as a cooling center of sorts during an event; this was reported by several communities in that they feel residents utilize these locations on extremely hot days. In the event of a projected heat event or heat wave, the Town is prepared to open up the cooling centers for resident use.

Summary

In general, the capabilities of mitigating extreme heat have increased since the 2017 edition of this plan as the town has identified multiple cooling centers for use during an extreme heat event.

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 Lebanon. The elderly populations in town are more vulnerable to extreme heat events, particularly when in home cooling is not available. Also, those in town with certain health conditions may also be more vulnerable to the health factors associated with extreme temperatures.

Because of the town's concern regarding private well vulnerability, those that rely on shallow/hand dug wells may face simultaneous challenges of extreme heat events coinciding during extended periods of drought and not having sufficient water to cooling and/or hydration.

The UConn Connecticut Institute for Resilience and Climate Adaptation (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 their overall heat vulnerability. The CCVI has been used as an additional tool to characterize heat vulnerability for Montville. The distribution of heat vulnerability throughout the community can be seen in Figure 6-1.

Heat exposure in Montville is highest in the areas in proximity to transportation routes and associated development clusters, with lower exposure across the less developed areas of the town. Notable areas of high heat exposure include the area south of the Mohegan Reservation and the area near Montville High School. Heat sensitivity is lower across much of the town, with pronounced pockets of higher sensitivity in the Chesterfield, Uncasville, and Mohegan villages. Adaptive capacity is relatively high, with multiple options for cooling centers and a vegetated landscape. Therefore, the overall heat vulnerability for Montville is moderate to high depending on location.

6.2.3.1 Hazard Losses

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

Figure 6-1 CCVI Heat Vulnerability for the Town of Montville

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 Montville. Structural fires in higher density areas of the Town are not directly addressed herein. According to the Town officials, no specific areas of elevated wildfire risk or vulnerability are known.

Recent notable brush fires include:

- A ten-acre wildfire occurred in 2010 after being accidentally set.
- In 2014, a large bird landing on power lines reportedly caused the lines to short-circuit and led to a brush fire. Responders had to wait for the power line to be disabled before they were able to fully engage. Tankers and brush trucks were used. The fire burned around ten acres.
- In the spring of 2016, Montville firefighters assisted in the response to a ten-acre brush fire in Ledyard, south of Whippoorwill Drive.

There have not been any brush fires reported since the 2017 HMP.

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 Company training, and maintaining an adequate supply of equipment. Each Fire Company has a variety of equipment, and the companies support one another throughout Town. Montville requires developments located more than 1,500 feet from the public water system to install either a dry hydrant, a 10,000 gallon water tank, or a fire pond.

Fire protection water is obtained through dry hydrants wherever possible and either 10,000 gallon water tanks or fire ponds wherever dry hydrants are not available. Pump trucks are relied upon to carry water to distant areas. Montville maintains mutual aid agreements with municipal fire departments in neighboring towns. This includes participation in the Tanker Task Force, which enables shared water tankers to respond to fires in areas without water service.

A new water tower built in East Lyme provides new fire-fighting water capabilities to a previously un-served area in the southwest corner of Montville. The Town is continuing to move forward with its Town Water Supply Plan (2016), which includes plans to expand the Town's fires suppression service. The amount of fire protection afforded by the dry hydrants, water tanks, fire ponds and pump trucks are considered to be adequate for the development level of Montville. Fire Companies continually evaluate the level of risk and the need for additional hydrants as development continues in the future. Town Officials would like to encourage the extension of water mains into developed areas that are not currently served.

The Montville Fire Companies support public outreach programs to increase awareness of forest fire danger, equipment usage, and protecting homes. In addition, the Montville Fire Company #1 have an active social media presence in which they post Daily Forest Fire Danger Reports on the Company's Facebook page.

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." Montville 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.

Summary

In general, municipal capabilities to mitigate wildfire damage have not increased significantly since the 2017 edition of the hazard mitigation plan was adopted.

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, there are no specific areas of wildfire risk or vulnerability in Montville. 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 Montville 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.

Although no major earthquakes have affected Montville since the last HMP, Montville lies above the Honey Hill Fault zone. The Honey Hill Fault is a significant fault zone that is considered moderately active by the Connecticut Department of Emergency Services and Public Protection (DESPP) and has been linked with recent small earthquake activity (on the order of one to two on the Richter scale) in East Haddam in April and May of 2012 as reported by the Weston Observatory at Boston College in Boston, Massachusetts. Montville personnel report feeling the Plainfield Earthquake “swarm” of 2015, which had a maximum magnitude between 2.2 and 3.3 on the Richter scale; no damage occurred locally due to that quake. It is very unlikely that the Town of Montville would be at the epicenter of a damaging earthquake.

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 Montville. 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 though they do indirectly limit residential development in areas prone to collapse (such as steep slopes) or liquefaction. However, the potential for an earthquake and emergency response procedures is addressed in the town’s EOP.

Montville maintains backup supplies at its critical facilities in case of regional transportation and utility disruption caused by an event such as an earthquake.

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, there are many areas throughout town that are 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. Those areas not at increased risk during an earthquake due to unstable soils are the areas underlain by glacial till.

Unlike seismic activity in California, earthquakes in Connecticut are not associated with specific active fault lines where tectonic plates meet. 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.

As noted in Section 2.1 and above, Montville lies above the Honey Hill Fault zone. The Honey Hill Fault is a significant fault zone that is considered moderately active by the Connecticut Department of Emergency Services and Public Protection and has been linked with recent small earthquake activity in East Haddam, on the order of 1 to 2 on the Richter scale. Towns that are intersected by this fault zone are considered at moderate risk for very low-intensity earthquakes such as those experienced in East Haddam.

The built environment in Montville 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. As mentioned previously, Montville has multiple areas of steep slopes and bluffs although almost all of these features occur in undeveloped areas. Thus, landslides are not a 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 HMCAP, dam failure has been addressed separately in Section 5.4. 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. This is covered in the Montville and Eversource's EOPs.

7.2.4 Hazard Losses

There are no reported losses for the Town of Montville 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

Montville	Residential	Commercial	Industrial	Others	Total
	$267,200,000	$363,080,000	$92,930,000	$214,830,000	938,040,000

8. Mitigation Strategies and Actions

8.1. Status of Mitigation Strategies and Actions

A total of 16 hazard mitigation actions were developed in the previous edition of this plan. The status of each is listed below.

Table 8-1 Status of 2016 to 2021 Hazard Mitigation Actions

#	Mitigation Actions and Strategies for Montville 2016 - 2021	Status	Status Details
1	Integrate elements of this HMP into the next *Plan of Conservation and Development* update	Complete	The most recent POCD was adopted in February 2022. Town staff believes there are some elements of HMP in this plan.
2	Consider requiring the underground installation of utilities for all new development where possible.	Capability	Town staff says this is likely already in practice.
3	More aggressively publicize the CT Prepares App to help residents remain informed of disasters	Complete	The town recently acquired Everbridge and is in the process of developing the list for people to subscribe, so this need has been addressed.
4	Using the process followed for the other critical facilities in the SCCOG Critical Facilities Assessment, assess the Montville Fire Company site and the roadway in front, as it provides access to and from the facility.	Carry Forward	Likely not complete, but the town will look into this.
5	Specific language regarding sea level rise should be reviewed when updating planning documents	Remove	The town does not experience much tidal flooding on the Thames River; flooding concerns are more related to beavers in the western part of town.
6	Continuously monitor Chesterfield Fire Company and Montville Fire Company for any future floodproofing needs which may include relocation	Carry Forward (as new Actions #3 and #4)	A downstream dam was removed (Picker Pond) near Rt 32 about two years ago. This has allowed for more flow and lower water surface elevations near Montville Fire Company. Beaver-related activity is a concern, and reportedly interacted with Ida to cause flooding near the fire house. No changes in Chesterfield have been reported; flood risk still comes from the backside of the property.
7	Visit schools and educate children about the risks of flooding and how to prepare	Remove	Replace with one educational action
8	Continue to pursue funding to conduct drainage improvements to Route 32 South at Jerome Avenue	Remove	Town has done some brush cutting and clearing in this location; not currently aware of additional concerns here other than one flooding complaint from a resident on Jerome Avenue. The town staff don't remember issues in this area during Ida.

9	Complete the culvert replacement on Old Colchester Road near Fair Oaks with HMGP funding	Complete	This is complete.
10	Pursue funding to improve drainage along Laurel Point Drive near Oxoboxo Lake	Carry Forward	The Laurel Point Drive area experienced major flooding during Ida, and reportedly floods even in lesser rain events.
11	Pursue funding to improve the drainage system on Fitch Hill Road near the intersection with Old Fitch Hill Road	Carry Forward	This is still a concern.
12	Work with the owners of Countryside Condominiums to report all flood damage and consider pursuing funding for floodproofing	Remove	This condo complex is located in Oakdale near Oakdale School. There is a high water table. The private condo association has a generator and a sump pump. Unclear what the town could do to mitigate this, as it is private property.
13	Complete the Public Works Department and Water Pollution Control Authority project to map all of the storm drains and signage in the Town	Complete	Public works and planning completed this and have also mapped some outfalls.
14	Assess the sinking problem being experienced by Georgia Manor Condominiums to determine the cause of the problem and possible solutions	Remove	This is another private condo association. An engineering study was conducted last year. One of the three buildings has reportedly sunk at least 8 inches and is still sinking about a quarter to half-inch per year. The cause of the sinking is unknown. At some point this building will likely be condemned. This is a private concern, and it can be removed from the HMP list.
15	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	Capability	It was noted that the latest data is now from NOAA rather than Cornell. The town contracts out engineering. The town will find out what modeling the engineers use for storm drainage.
16	Visit schools and educate children about the risks of wind events and how to prepare for them	Remove	Replace with one educational action.

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 three 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 Montville to undertake from 2023 through 2028 are listed in Table 8-2 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:

- Extend sewer system to reduce flood impacts to septic systems and make private properties and critical facilities more resilient.
- Using the process followed for the other critical facilities in the SCCOG Critical Facilities Assessment, assess the Montville Fire Company site and the roadway in front, as it provides access to and from the facility.
- Actively partner with the Chesterfield Fire Company to monitor for any future floodproofing needs which may include relocation, as described in the Southeastern Connecticut Critical Facilities Assessment.

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

- Identify formal cooling centers from the available candidates (Senior Center and Town Hall gym), ensure standby power is available to operate air conditioning, and ensure that transit or alternate transportation methods are available.

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

Table 8-2 Town of Montville 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	PERISTS Score	STAPLEE Score	PERSISTS x STAPLEE =
MV1	Identify formal cooling centers from the available candidates (Senior Center and Town Hall gym), ensure standby power is available to operate air conditioning, and ensure that transit or alternate transportation methods are available.	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
MV2	Maintain the Middle School as a local shelter for situations when the regional shelter in East Lyme cannot be accessed.	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	5	80
MV3	Using the process followed for the other critical facilities in the SCCOG Critical Facilities Assessment, assess the Montville Fire Company site and the roadway in front, as it provides access to and from the facility.	Reduce flood and erosion risks by reducing vulnerabilities and consequences, even as climate change increases frequency and severity of floods.	Property Protection	Office of the Chief Elected Official	$10,000 - $25,000	DEEP Climate Resilience Fund; STEAP	7/2023 - 6/2025	Medium	20	5	100
MV4	Actively partner with the Chesterfield Fire Company to monitor for any future floodproofing needs which may include relocation, as described in the Southeastern Connecticut Critical Facilities Assessment.	Reduce flood and erosion risks by reducing vulnerabilities and consequences, even as climate change increases frequency and severity of floods.	Property Protection	Office of the Chief Elected Official	$10,000 - $25,000	Municipal CIP Budget	7/2023 - 6/2025	Medium	20	5	100
MV5	Pursue funding to improve drainage along Laurel Point Drive near Oxoboxo Lake.	Reduce flood and erosion risks by reducing vulnerabilities and consequences, even as climate change increases frequency and severity of floods.	Structural Projects	Public Works	$100,000 - $500,000	DEEP Climate Resilience Fund; Municipal CIP Budget	7/2023 - 6/2025	Medium	13	3	39
MV6	Pursue funding to improve the drainage system on Fitch Hill Road	Reduce flood and erosion risks by reducing	Structural Projects	Public Works	$100,000 - $500,000	DEEP Climate Resilience Fund;	7/2024 - 6/2026	Medium	13	3	39

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	PERSISTS x STAPLEE =
	near the intersection with Old Fitch Hill Road.	vulnerabilities and consequences, even as climate change increases frequency and severity of floods.				Municipal CIP Budget					
MV7	Extend sewer system to reduce flood impacts to septic systems and make private properties and critical facilities more resilient.	Reduce flood and erosion risks by reducing vulnerabilities and consequences, even as climate change increases frequency and severity of floods.	Water & Wastewater Utility Projects	Water & Sewer	>$1M	CWSRF; Municipal CIP Budget	7/2023 - 6/2028	Medium	14	8	112
MV8	Extend public water systems to reduce drought impacts to properties currently served by private wells; and to provide fire protection.	Reduce losses from other hazards that are affected by climate change.	Water & Wastewater Utility Projects	Water & Sewer	>$1M	DWSRF; Municipal CIP Budget	7/2023 - 6/2028	Medium	14	6	84
MV9	Educate residents via mailer on the importance of water conservation during dry periods as to avoid wells running dry.	Reduce losses from other hazards that are affected by climate change.	Education & Awareness	Conservation Staff	$0 - $10,000	Municipal Operating Budget	7/2023 - 6/2024	Medium	13	4	52
MV10	Work with the Mohegan Tribe and other stakeholders to address the drainage concern/post-Ida damage on Driscoll Drive.	Reduce flood and erosion risks by reducing vulnerabilities and consequences, even as climate change increases frequency and severity of floods.	Structural Projects	Public Works	$100,000 - $500,000	Municipal CIP Budget	7/2024 - 6/2026	Low	11	3	33
MV11	Provide links and information to natural hazard mitigation and preparedness on the Town emergency management website.	More than one goal	Education & Awareness	Emergency Management	$0 - $10,000	Municipal Operating Budget	7/2023 - 6/2024	Medium	13	4	52
MV12	Work with CT DEEP to update the list of repetitive loss properties and ensure that errors and updates are incorporated by FEMA.	Reduce flood and erosion risks by reducing vulnerabilities and consequences, even as climate change increases	Property Protection	Floodplain Manager	$0 - $10,000	Municipal Operating Budget	7/2023 - 12/2023	High	12	6	72

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	PERSISTS x STAPLEE =
		frequency and severity of floods.									
MV13	Conduct direct outreach to property owners in repetitive loss areas with information about how to mitigation flood losses.	Reduce flood and erosion risks by reducing vulnerabilities and consequences, even as climate change increases frequency and severity of floods.	Property Protection	Floodplain Manager	$0 - $10,000	Municipal Operating Budget	1/2024 and annually during January	High	13	4	52
MV14	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