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# TOWN OF SPRAGUE ANNEX DOCUMENT

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

March 2023



**PREPARED FOR:**  
Town of Sprague  
1 Main Street  
Baltic, CT 06330  
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# 1. Introduction

## 1.1. Purpose of Annex

The planning process for the multi-jurisdiction hazard mitigation plan update commenced in April 2022 and ended in December 2022, spanning a period of nine months. The planning process included 24 jurisdictions (22 municipalities and two tribal governments) with two participating together (Griswold and Jewett City) for a net total of 23 local planning teams represented. For this 4<sup>th</sup> 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 Sprague. 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 details for Sprague 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

Sprague consists of the three villages of Baltic, Hanover, and Versailles. Sprague is a town of 13.8 square miles that lies in north-central New London County and is bordered by Scotland and Canterbury to the north (both part of Windham County), Lisbon to the east, Norwich to the south and Franklin to the west. The most significant surface water bodies include the Shetucket River which traverses through the center of town and the Little River which includes the Hancock Reservoir near the northeast corner of town, Papermill Pond, and Versailles Pond. Little River joins the Shetucket River at the southeastern tip of Sprague where Sprague borders the Town of Lisbon and the City of Norwich. The three major transportation routes through town include Route 97 which runs north-south through the center of town and Routes 138 and 207 which run east-west across the southern portion of Sprague.

### 2.1. Physical Setting

The Town of Sprague is a cross between a suburban and rural community. Although the town has extensive undeveloped land, it has three villages: Baltic, Versailles, and Hanover.

Sprague had a 2020 U.S. Census population of 2,967, almost identical to its 2010 U.S. Census population of 2,984. Each village within Sprague has its own post office. In Baltic, residential, commercial, and industrial development is generally concentrated along the Shetucket River and Beaver Brook, near Routes 97 and 207. In Versailles, development is generally concentrated in the vicinity of Versailles Road, Papermill Road, Inland Road and other areas along the banks of the Little River. The Village of Hanover is located north of Baltic on Baltic-Hanover Road and includes development in the vicinity of the Little River, Adams Brook, and the Hanover Reservoir.

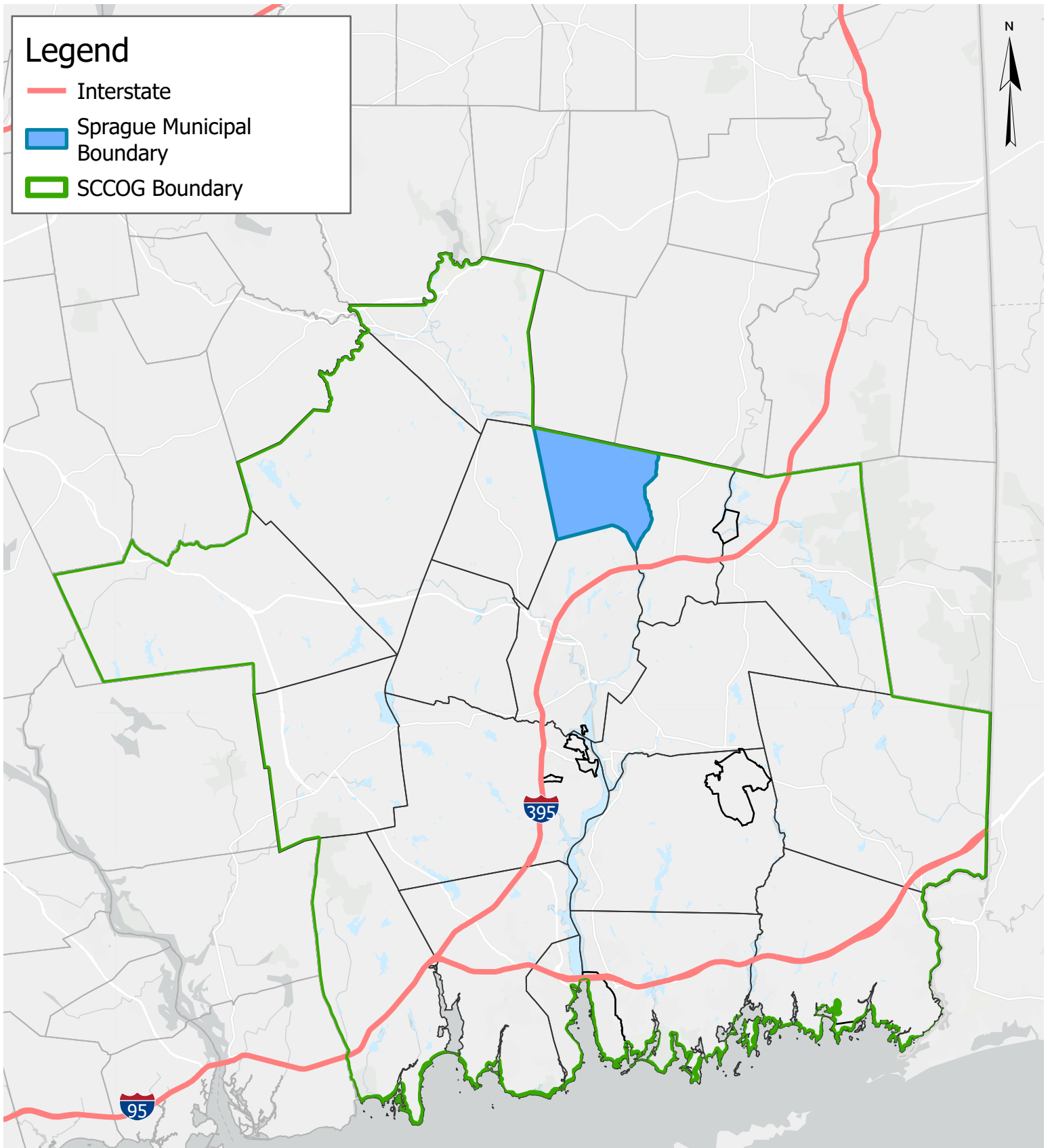
Elevations in the community range from 460 feet NGVD88 along the northern corporate limits, 1.5 miles east of the Shetucket River, to 70 feet NGVD88 at the southern tip of the community, where the Shetucket River flows out of Sprague.

Sprague is covered primarily by glacial till. Till contains an unsorted mixture of clay, silt, sand, gravel, and boulders deposited by glaciers as a ground moraine. The amount of stratified drift present in Sprague 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. Even the smaller glacial till watercourses throughout Sprague can cause flooding. In Sprague, the areas underlain by stratified drift are mostly associated with Old River Farm Brook, the Shetucket River, tributaries to the Shetucket River including Waldo Brook, Beaver Brook, Adams Brook, Little River, and some smaller tributaries. The amount of stratified drift also has bearing on the relative intensity of earthquakes and the likelihood of soil subsidence in areas of fill.

Sprague is characterized by four bedrock formations which are oriented in a northeast-southwest direction through town. There is one geologic fault that is oriented from northwest to southeast that crosses just above the Sprague-Norwich town line. This fault extends southeast from south-central Sprague southeast into North Stonington. This is the lone fault in town.

# Legend

- Interstate
- Sprague Municipal Boundary
- SCCOG Boundary

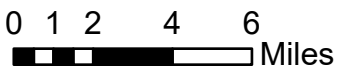


## Regional Location of Sprague

SCCOG Hazard Mitigation and Climate Adaptation Plan

Town of Sprague

Date: 7/22/2022



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



The four bedrock formations in Sprague are briefly discussed below.

- The *Scotland Schist Formation* is a grey to silvery, locally rusty, fine to medium-grained schist.
- The *Hebron Gneiss Formation* consists of interlayered dark grey and greenish gray schist with fine to medium grained calc-silicate gneiss.
- The *Canterbury Gneiss Formation* is comprised of a light-grey, medium grained, locally strongly lineated gneiss.
- The *Tatnic Hill Formation* consists of three variations in Sprague: the Yantic Member, the Fly Pond (calc-silicate) Member, and the pure Tatnic Hill Formation. Each is subdivided below.
  - *Tatnic Hill Formation* is a grey to dark grey, medium-grained gneiss or schist.
  - *Yantic Member of Tatnic Hill Formation* consists of a grey to dark grey, fine to medium-grained schist.
  - *Fly Pond (calc-silicate) Member of Tatnic Hill Formation* is comprised of a light grey, medium-grained calc-silicate gneiss.

The three variations of the Tatnic Hill Formation cover approximately 77% of Sprague stretching from central Sprague east to the town line with Lisbon from north to south covering all of town from the northern town line to the southern town line.

## 2.2. Drainage Basins and Hydrology

Sprague is divided among three sub-regional watersheds: Beaver Brook, Shetucket River and the Little River from west to east. The town lies entirely within the Shetucket River regional watershed. The Shetucket River is formed by the confluence of the Willimantic and Natchaug Rivers south of Willimantic, Connecticut. The Shetucket flows south to Norwich, where its confluence with the Yantic River forms the Thames River. The Shetucket River has a drainage area of approximately 1,264 square miles and is approximately 18 miles in length. Primary tributaries to the Shetucket River are the Quinebaug, Natchaug, and Willimantic Rivers.

The Little River originates in Hampton, and flows through Hanover Reservoir, Paper Mill Pond, and Versailles Pond along the east side of Sprague, eventually discharging into the Shetucket River in the Village of Occum. The Little River has a drainage area of approximately 46 square miles.

The Beaver Brook Watershed is the smallest watershed in Sprague. Beaver Brook originates at Gager's Pond in Franklin and flows southeast to its confluence with the Shetucket River in the Village of Baltic.

There are several man-made water bodies in Sprague. Paper Mill Pond and the Hanover Reservoir are located on the Little River. The Hanover Reservoir has not been used as a water supply for Hanover since the mid-1970s when the storage capacity for the system was destroyed in a mill fire. Since this time, the eastern shore of the water body has been developed with residences, and the remainder of the western shore has been subdivided recently so that it would be difficult to utilize this as a water supply in the future.

The Baltic Reservoir is located in the central portion of the town. The reservoir is approximately 23 acres in area and the watershed totals 0.29 square miles. The reservoir was historically used as a water supply source but is now primarily used for recreation.

### 2.3. Land Cover

According to the 2016 1-meter resolution land cover developed by the NOAA Office of Coastal Management, Sprague is predominantly comprised of mixed forest, with approximately 67.71% of the town classified as such. The second largest land cover type is developed open space, which covers about 7.06%, and next is grassland/herbaceous landscapes which is about 4.53% of land cover. Only about 3.96% of the town is developed impervious land cover. All land covers and their percent coverage can be found in Table 2-1.

Table 2-1 Town of Sprague Land Cover

Land Cover Type (2016)	% Coverage
Barren Land	0.99
Cultivated Crops	3.22
Developed, Impervious	3.96
Developed, Open Space	7.06
Grassland/Herbaceous	4.53
Mixed Forest	67.71
Open Water	3.30
Palustrine Aquatic Bed	0.65
Palustrine Emergent Wetland	0.53
Palustrine Forested Wetland	2.69
Palustrine Scrub/Shrub Wetland	0.05
Pasture Hay	2.86
Scrub/Shrub	2.45

### 2.4. Population, Demographics, and Development Trends

The Town of Sprague is approximately 90% undeveloped according to the University of Connecticut Center for Land Use Education and Research (CLEAR). According to the CLEAR database, land use in Sprague includes but is not limited to agriculture, deciduous and coniferous forests, forested and non-forested wetland, turf and grass, barren land, agriculture, open water, and developed land cover. Sprague's 2006 CLEAR land cover data, which was derived from satellite imagery, explains that over half of the town's approximately 13.8 square miles is either deciduous forest or agricultural land.

SCCOG data on land use collected in 2011 indicates that approximately 29% of Town land is developed, 13% has been dedicated to open space, and 32% remains hypothetically open to development. Much of the gap between the CLEAR and SCCOG figures may be due to differences in land use designation criteria. 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.

According to the 2011 SCCOG data, 54% of Sprague's developed area is low and very low density residential land, while 9% is medium and high density residential. 13% is transportation,

communications, or utility usage. The remaining approximately 24% of the developed area consists of industrial, commercial, and institutional uses.

As earlier described, Sprague is a cross between a suburban and rural town which has been relatively stable in population of around 3,000 residents for the past 50 years. The town includes the three villages with concentrated development. Both residential and commercial development increased slightly following the establishment of Interstate 395.

According to the 2007 *Plan of Conservation and Development* (POCD), Sprague hopes to focus the majority of its growth in and around its village centers, while exploring the possibility of modest expansion of business in its industrial zone while allowing the opportunity for lightly developed land uses along its major roadways outside of the village centers. The document also stated that new residential construction was taking place along Scotland Road as well as Baltic-Hanover Road near the reservoir. Additionally, the document states that the Village of Baltic in many ways acts as the center of Sprague, mostly because the Town Hall is within the village along with the fact that it is the most densely-developed area of Sprague. The document also states that the development patterns in Baltic have led to the establishment of two distinct districts: a mixed use district and a commercial and industrial strip of development. The majority of the language regarding undeveloped land discussed in the POCD discusses the intent of the town to hold the undeveloped land as such for the future. A 2012 amendment to the POCD makes promotion of farming and agriculture an important part of the Town's overall plan to protect and preserve open space and enhance the Town's economic base.

Since the previous HMP, there has not been a significant amount of development in town. Some of the ongoing projects include:

- The approval of a 90-unit complex for the Versailles area. There is no fire suppression in this area, however the property owner is developing a plan to address this.

Aside from these projects, very little development is underway in Sprague. Nevertheless, new development and redevelopment do not increase risks to natural hazards. Redevelopment throughout the community offers significant opportunities for flood mitigation to be incorporated into buildings and stormwater management to be addressed on-site; and new development is constructed per the flood damage prevention, wind loading, and snow loading requirements in the State Building Code.

As of the 2020 Decennial Census, the population for the town is 2,967, which equates to about 225 people per square mile. The 2020 American Community Survey 5-year estimates identified the annual average median income for Sprague to be \$72,989, with an average of 21.8% of the population holding a bachelor's degree or higher, and an average unemployment rate of 3.8% throughout the town.

## 2.5. Governmental Structure

Sprague is governed by a Town Meeting and Board of Selectmen form of government. The Town Meeting is the legislative body of the town, and the Board of Selectmen is responsible for the administration of town policies. The authority of town officials is granted by the Connecticut General Statutes. Various Boards and Commissions are composed of elected and appointed officials who supervise, manage and organize the diverse functions of local government. Many municipal departments, commissions, and boards are involved with natural hazard mitigation.

Sprague has several departments which provide municipal services. Departments pertinent to natural hazard mitigation include the First Selectman, Public Works, Fire Department/Fire Marshal, Resident State Trooper, Emergency Management, Tree Warden, and Building Inspector/Wetlands Officer. In addition, boards and commissions can take an active role in hazard mitigation, including the Inland Wetlands & Watercourses Commission, the Planning & Zoning Commission, the Economic Development Commission, and the board of Selectmen. The general roles of most of these departments and commissions are common to most municipalities in SCCOG and were described in Section 2.9 of the Multi-Jurisdictional HMCAP. The roles of town departments, boards, and commissions have not changed since the time of the previous HMP. Thus, the Sprague is technically, financially, and legally capable of implementing mitigation projects for natural hazards. More specific information for certain departments and commissions of the Town of Sprague is noted below:

- Among other items, the First Selectman and the Executive Assistant are responsible for the town's public safety (specifically the town's performance pertinent to police, fire, and emergency services in the event of natural disasters), overseeing Public Works operations including tree trimming and road repairs, and overseeing Community Services and Economic Development in an effort to enhance the town's residential and commercial market value.
- The Emergency Management Director (EMD) is responsible to, among other duties, prepare and maintain the town's EOP, recommend mitigation measures to reduce disaster effects, participate in all tests, drills and exercises, including remedial drills and exercises that pertain to Sprague, as scheduled by the town, state or the Federal government, participate in the integrated flood warning systems program as applicable, and provide warning to the town regarding fallen trees and ice jams along the Shetucket River and Beaver Brook. The EMD position is a part-time position in Sprague.
- During emergencies, the EMD activates the Emergency Management Team, created within the last five years. This team consists of six to eight people, including three Public Works employees (two of them part-time employees) and the EMD (also a part time employee).
- The Baltic Volunteer Fire Department has one fire station which is staffed by one hundred percent volunteer firefighters. The department is comprised of 39 volunteer firefighters. The Fire Department is the secondary shelter and has a generator with a 240 hour per tank capacity and seven portable limited use generators and four vehicle mounted generators. The facility was used as a warming, charging, and showering station during Tropical Storm Irene and Winter Storm Alfred. In addition to hazard mitigation and firefighting, the Department also provides emergency medical service, hazardous material response, vehicle rescue and extraction and search and rescue services.
- The Planning & Zoning Commission (PZC) is charged with the civic duty of preparing, adopting or amending the POCD. The PZC is also responsible for establishing, changing, or repealing zoning and subdivision regulations and zoning districts and review and make recommendations on proposed municipal improvements such as streets, utilities and sidewalks.
- The Town of Sprague does not have its own police force, but rather relies on the services of a Resident State Trooper who operates out of the Town Hall building and is on the same radio network as the town. The Resident State Trooper has an All-Terrain Vehicle (ATV) to patrol open space areas.

- The Public Works Department is responsible for maintaining and enhancing the community infrastructure assets which include the road network, sidewalks, roadway signs, stormwater management system, parks, land preserves, recreation fields, and some of the historic structures and cemeteries in the three villages of Sprague. Additionally, the Public Works Department is charged with immediately responding to natural and/or man-made disasters when called upon by the First Selectman to clear the roadways during and after winter storms, tropical storms, and hurricanes.
- The Tree Warden is appointed by the Board of Selectmen. The Tree Warden has jurisdiction over the care and control of all trees within the town's rights-of-way and municipal properties. The powers include hazardous tree removal, tree removal for road improvement and drainage work, utility line clearing, line of site improvement, and pruning.

## 2.6. Review of Existing Plans and Regulations

Sprague has two primary Plans which act to address elements of hazard mitigation and disaster preparedness.

### Plan of Conservation and Development (2018)

The POCD was most recently updated in 2018 with contributions from local boards, commissions, committees, citizens and citizen groups. The Plan seeks to be a statement of policies, goals and standards for the physical and economic development of the Town and recommends the most desirable uses types and population densities in various parts of the municipality.

The 2018 Town of Sprague POCD includes the following actions:

- Continue to protect wetlands, waterbodies, and floodplains, and support best management practices for soil conservation.
- Amend zoning regulations to increase building setbacks from waterbodies (rivers, streams, ponds, reservoirs).
- Work with property owners, State, Friends of Shetucket, and others to acquire additional open space parcels and/or conservation easements along the Shetucket River.
- Considerations should be made to extend water and sewer service areas to induce growth in Baltic Village.
- Replace the 100+ year old sewer lines in Hanover.
- Consider regionalizing water service with Norwich Public Utilities (NPU) to provide secure and additional water supply for Baltic.

Therefore, the Sprague POCD is considered somewhat consistent with the current goals and actions of the hazard mitigation plan, as it does not directly address several of the hazards such as emergency hazard response, wind damage and winter storm hazards, among others. The next update to the POCD (scheduled for 2028) will continue to incorporate the elements of the hazard mitigation plan.

### Emergency Plans

The Town has an Emergency Operations Plan (EOP) which is updated annually, an Emergency Response Plan (ERP) for Sayles School, and a Local Emergency Medical Services Plan outlining the capabilities of Sprague during emergencies.

Sprague has an EOP in place signed by the First Selectman, approved by the Board of Selectmen, and extending the duties and powers of the First Selectman and/or his designee in the event of a declared emergency. The EOP explains that Sprague is exposed to a number of natural hazards that may require the implementation of the EOP. These hazards include major snow fall, ice storms, blizzards, tornadoes, hurricanes, flooding, electrical storms, major fires, forest fires, dam failure, water contamination, earthquakes, and major highway accidents as a result of many of these.

Sections I through VII of the EOP provide its purpose, concept of operations, organization of responsibilities, administration/logistics, plan development and maintenance, and authority and references. Annexes A through L deal specifically with emergency response procedures for various incidents.

#### Zoning, Subdivision, and Inland Wetland and Watercourses Regulations

Hazard prevention includes identification of risks and the use of land-use regulatory and other available management tools to prevent future damage. The town of Sprague has *Subdivision Regulations* (Revised to August 1, 2012), *Zoning Regulations* (August 16, 2022), *Inland Wetland and Watercourses Regulations* (Eff. June 22, 2012) and ordinances in place that flood damage prevention. Section 11.14 Special Flood Hazard Area (SFHA) Requirements of the *Zoning Regulations*, Sections 6.2(b)25 ("Subdivision Plan"), 7.18 ("Floodway Encroachments") and 7.19 ("Flooding Considerations") in the Subdivision Regulations are the Town's articulation of the NFIP regulations. Activities that are regulated within 100 feet of a wetland or watercourse are outlined in Sections 2 and 4 of the *Inland Wetlands and Watercourses Regulations*.

Stormwater requirements are enumerated in Section 13.3 and 13.4 of the Zoning Regulations, Section 6.2 of the Subdivision Regulations and in Section 3.4 of the "Design and Construction Specifications" in the *An Ordinance Regulating the Addition of Any New Street to the Highway System of the Town of Sprague* (Rev. August 1991). The regulations provide required design practices and technical standards and require conformance with the state's *Stormwater Quality Manual*.

Additionally, the town regulates street widths, snow shelves, and steep slopes in Section 3 and drainage rights and/or easements in Section 4 of the *An Ordinance Regulating the Addition of Any New Street to the Highway System of the Town of Sprague*. Street systems and continuity is discussed in Section 7.5 of the Subdivision Regulations, while underground utility requirements are discussed in Section 7.20 and private, common and/or shared driveway and street regulations are discussed in Section 6.4.6.

Finally, the town's Building Inspector enforces the Connecticut State Building Code.

#### Forest Management Plan

The Forest Management Plan guides tree maintenance for all Town-owned open space.

### 2.7. Critical Facilities, Sheltering Capacity, and Evacuation

The Town of Sprague considers that several categories of facilities are critical for these are needed to ensure that emergencies are addressed while day-to-day management of the community continues. Critical facilities are presented on figures throughout this annex and summarized in Table 2-2. These facilities are described in more detail below.

Table 2-2 Town of Sprague Critical Facilities

Facility	Address or Location	Emergency Power	Shelter	Cooling Center	In SFHA
<b>Emergency Services</b>					
Baltic Fire Department (Backup EOC)	22 Bushnell Hollow Rd	✓	✓	✓	
<b>Municipal Facilities</b>					
Town Hall*	1 Main Street, Baltic	✓		✓	✓
Public Works Garage	1 Main Street, Baltic	✓			✓
Sayles Elementary School	25 Scotland Road	✓	✓	✓	
<b>Health Care/Senior Living</b>					
Shetucket Village (senior living)	8 Wall Street	✓			
<b>Other Infrastructure/Facilities</b>					
Hanover Nursery School	40 Potash Hill Road				
Daycare (private home)	Parkwood Road				
Hanover Rd sewer pumping station	Hanover Rd, Baltic				✓
Water filtration plant		✓			✓
Sewer Treatment Plant	45 Bushnell Hollow Rd	✓			✓
Sewer pumping stations	Various	✓			✓
Water supply wells	River Rd, Hanover Versailles Rd	✓			✓

\* Emergency Operations Center

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 Town Hall and Public Works complex in Sprague were included. The assessment determined that the parking lot and lower levels of the facility face current flood risks. Recommendations are incorporated into the list of actions in Chapter 11 of this annex and summarized below in Table 2-3.

Table 2-3 SCCOG Critical Facilities Assessment Summary for Town of Sprague

Facility	Address	Short-Term (0-20 years)	Long-Term (>20 years)
Town Hall and Public Works	1 Main Street	Eliminate basement utility room	Wet floodproof all remaining low areas or construct a flood wall

#### Fire Department

Sprague's Fire Company, Baltic Fire Engine Company No. 1, is located on Bushnell Hollow Road (Route 138). The Fire Department consists of 100 percent volunteer membership. Although the station is located near the Shetucket River, it is not located in a flood zone. The Fire Department is currently the backup Emergency Operations Center (EOC). The Fire Department has a 240-hour per tank generator and was used during Tropical Storm Irene and Winter Storm Alfred as a warming, charging, and

showering station. The Fire Department also has seven portable limited use generators and four vehicle-mounted generators.

The Fire Department has gained access to portable, vehicular and base radios since the town's recent communications system upgrade. Firefighters played an instrumental role in hand-delivering informational flyers to homes lacking power to continue information flow regarding shelters and major road issues throughout Tropical Storm Irene and Winter Storm Alfred.

#### Municipal Facilities

The First Selectman notes that all municipal buildings have emergency generators except for the transfer station and the grist mill. A grant has been submitted to purchase and install generators for these sites.

Town Hall is the primary EOC. Town Hall is equipped with a generator which was used during Tropical Storm Irene. During Tropical Storm Irene and Winter Storm Alfred, many EOC operations were directed from the Court Room in the Town Hall. In addition, the Town Hall is the office location for the town's Resident State Trooper who is on the same radio network as the town and has access to an ATV to patrol open space areas. Town Hall has sandbags available on site for use during flood emergencies.

The Department of Public Works Garage and its crew have access to portable, vehicular and base radios as a result of the town's recently upgraded radios and interdepartmental and intermunicipal communication capability. The Public Works Garage houses the town's snow and salt stockpile and equipment used to plow roadways and perform tree maintenance and trimming.

Sprague's water and sewer facilities include the Sprague WPCF, the Sprague Water Filtration Plant, the Sewer Pump Stations 1, 3, and 4, and the well houses:

- Sprague's Sewer Plant is reportedly in need of an upgrade as it is in excess of 45 years of age and is located within the floodplain. Additionally, the town's pumping stations are believed to each be in a floodplain. The Hanover Sewer Pump Station serves 60 homes and was recently completely rebuilt, with an emergency generator installed. Each of the other three pumping stations in Town have also been rebuilt in the last five years. Piping was also upgraded in Versailles and Baltic; pipe upgrades are still needed in Hanover.
- The Sprague Water & Sewer wellfield located next to the park between the Shetucket River and River Street is situated in the floodway of the Shetucket River, and Sprague's three water supply wells are located in the SFHA. The First Selectman reports that the water system is in need of many upgrades.

#### Sheltering Capacity

Sayles Elementary School is the primary shelter since it has showering capability and can hold more people than Baltic Fire Engine Company No. 1. The building is not ARC certified; however, it has a generator. The generator can run for 72 hours per tank of gas. As a shelter, Sayles Elementary School is designed to hold 600 people with a bedding capacity of 300.

Baltic Fire Engine Company No. 1 is the secondary shelter and has a generator with a running duration of 240 hours per tank of gas. However, the facility can only house a small number of people. It was used



as a warming / charging / showering station during Irene and Alfred. The Fire Department also has seven portable limited use generators and four vehicle mounted generators.

The town maintains a list of people who may need additional help during an emergency and maintains a list of property and road information, including the number of residential and commercial structures on each street. The Senior Center Director maintains this list. Additionally, the town has buses and wheelchair-accessible vans to transport seniors during weekdays.

The town has also identified the Town Hall as the first choice for a cooling center, and the Elementary School as a second choice. If necessary, the Town could also open the fire department as a cooling center, however, this is a secondary option given that emergency personnel may be using the facility during an event.

#### Other Infrastructure / Facilities

Warning the residents of the town of a disaster is accomplished by an existing siren (single tone) long wailing tone. The siren is activated/controlled by Baltic Fire Engine Company No. 1. Radio stations WICH (Norwich) and WCTY (Norwich) are the local emergency broadcast stations in the area. Sprague participates in CT Alert but does not have its own local mass public warning system. Town Hall maintains a list of people who are elderly or disabled and need to be checked on prior to, during, and after hazard events. During power outages, the Fire Department will stop by their homes.

Portable, vehicular, and base radios, located at the Town Hall, Baltic Fire Engine Company No. 1, and the DPW Garage, are included in the town's stockpile. In addition to inter-departmental communication, the town can also communicate with several of its neighbors (Griswold, Lisbon, Franklin, and Lebanon) on its radio system. The town has one cell tower and one repeater. In addition to the Emergency Management Director, the Community Emergency Response Team (CERT) provides warning to Sprague regarding natural hazards, such as fallen trees and ice jams along the Shetucket River and Beaver Brook.

Eversource maintains emergency operation centers which become operational in the event of any emergency that could impact the utilities. The communication between the town and independent utilities requires continued coordination to assure understanding.

The Gristmill is a Community Center located across the street from the Town Hall. The building is vulnerable to flooding from both the Shetucket River and Beaver Brook. Sandbags are stored on site for deployment in a flood.

There are two daycare centers which are in private homes in Sprague. One center is located on Potash Hill Road and the other is located on Parkwood Road.

The Shetucket Village senior housing has installed a new generator since the 2017 HMP. However, the town is concerned with the capacity of this generator as the air conditioner cannot be run on the generator during an outage.

There is a total of three sewer pumping stations in town. In the event of an outage the town has portable generators that can be delivered to the pumping stations if necessary.

#### Evacuation Routes

Annex E of the EOP addresses evacuation procedures. The annex describes the responsibilities of each of the key players in emergency management including the Town Selectman, Evacuation Coordinator,

Emergency Management Director, Police Department, Highway Department, Public Information Officer, Shelter Coordinator, Health and Medical Coordinator, and Superintendent of Schools.

Sprague does not have a published evacuation map, but rather utilizes state roads or local roads to exit the town. The SCCOG Long Range Regional Transportation Plan (FY 2011-2040) addresses the adequacy of the existing transportation system in southeast Connecticut to move large numbers of people in the event of some type of disaster. Higher capacity egress routes from Sprague include Route 138, Route 97, and Route 207. Route 97 is the highest capacity egress route that leads directly to Interstate 395 from Sprague. The plan recommends increasing the capacity of Interstate 395.

The evacuation of "special needs" populations is specified in the facilities' own emergency plans. These would include day care centers (two located at Potash Hill Road and Parkwood Road) and public (Sayles School) and private (Holy Family and St. Joseph's) schools. The disabled population (hearing/sight/mentally/mobility impaired) should be monitored by the Town Health, Medical Department, and the area Visiting Nurses Association.

### 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 Sprague has no RL properties.

### 2.9. Exposure to Climate-Affected Natural Hazards

Properties, people, historic resources, and critical facilities in the Town are exposed to natural hazards affected by climate change (i.e., severe storms, coastal flooding, droughts) as well as hazards that are not affected by climate change (i.e., earthquakes). As an initial screening of exposure to hazards, areas of risk have been overlaid onto parcel and point data in a GIS to understand the maximum potential exposure to hazards. The results of this analysis are found in Table 2-4.

Table 2-4 Town of Sprague Exposure Analysis

Hazard	At-Risk Parcels		At-Risk Facilities		At-Risk Historic Assets	
	Value	Number	Value	Number	Value	Number
<b>Hurricane/Tropical Storm</b>	\$159,923,368	1,249	\$5,842,050	7	\$1,126,870	9
<b>Severe Thunderstorm</b>	\$159,923,368	1,249	\$5,842,050	7	\$1,126,870	9
<b>Severe Winter Storm</b>	\$159,923,368	1,249	\$5,842,050	7	\$1,126,870	9
<b>Tornado</b>	\$159,923,368	1,249	\$5,842,050	7	\$1,126,870	9
<b>Drought</b>	\$130,718,588	982	\$645,630	3	\$833,950	5
<b>Flood</b>						
1% Annual Chance	\$37,737,208	286	\$1,166,140	4	\$107,410	1
0.2% Annual Chance	\$44,145,048	348	\$1,166,140	4	\$107,410	1

<b>Earthquakes</b>	\$159,923,368	1,249	\$5,842,050	7	\$1,126,870	9
<b>Wildfire</b>	\$109,809,628	783	\$645,630	3	\$833,950	5

## 2.10. Community Climate Change Challenges

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

# Climate Change Summary Sheet for Town of Sprague

## What are the Town's Top Climate Change Concerns?

**Flooding:** The Town Hall and Public Works Facility is located in the floodplain where a stream joins the Shetucket River. Although flood risks are believed low, a significant flood could adversely impact the Town's operations.

**Extreme Heat:** Generator capacity at the Shetucket Village Senior Housing is limited and air conditioning cannot be run on a generator, leaving residents at risk to extreme heat events.

**Others:** Sewer and drinking water infrastructure is aged and in need of upgrades or replacement, which will provide opportunities for incorporating climate resilience.

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

**Flooding:** Eliminate utility room in the basement of the Public Works/Town Hall and relocate utilities to a higher location. Incorporate floodproofing of remaining low areas in the building, or a floodwall protecting the site, into the Town's long-term planning by including this in the POCD and the Capital Improvement Plan.

**Extreme Heat:** Replace or augment the standby power at Shetucket Village senior housing to allow for operation of the AC system.

**Others:** When replacing or upgrading aged sewer and sewer treatment infrastructure, incorporate standby power and hardening techniques to make them more resilient. Add appropriate narratives to the POCD and Capital Improvement Plan.

## 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.<sup>1</sup> There is a similar lack in confidence when projecting severe thunderstorm and wind events. Because these events are short-lived and relatively small-scale, monitoring and modeling are more challenging. Overall, however, future climate conditions are likely to become more conducive to the development of such events, therefore increasing the potential for occurrence.

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

These changes in storms could equate to an increase in risk throughout the town, 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 winds, heavy rains, and flooding. These hazards are widespread and can affect any part of Sprague. However, some buildings within town are more susceptible to wind or flooding damage than others. Tropical Storm Irene and Superstorm Sandy, described below, remain some of the most impactful storms in the past decade.

- Tropical Storm Irene impacted the region in August 2011. Branches, trees, utility lines, and other items fell throughout town, causing power outages reportedly up to one week and areas along roads and near residences were hardest hit.
- In 2012, 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

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

action was combined with sustained winds of 40 to 60 mph and wind gusts of 80 to 90 mph. Emergency managers recommended mandatory evacuations of 362,000 people that lived in low lying areas. Widespread significant statewide power outages of 667,598 lasted up to 8 days. The town of Sprague received over \$45,000 in disaster relief from FEMA to cover the cost of damages from the storm.

Since 2017, there have been several storms that have cause storm damage throughout the region. On August 2, 2020, Tropical Storm Isaias swept through the State bringing severe winds which resulted in the highest number of outage events Connecticut has ever experienced. With over 620,000 outages reported by Eversource alone, the state's largest electric supplier, residents across the SCCOG region were without power, cable, and internet for extended periods of time. While this storm did not generate typical amounts of rainfall experienced during a tropical storm event, the wind damage exceeded expectations bringing down trees and power lines across the state.

In 2021, there were four tropical storm events that passed through, or within 50 miles of, the state. Some of these events, which are described in more detail below, resulted in flooding along several brooks and stream crossings, including roadway washouts.

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. Sprague reported that Ida caused several road washouts in town; these have since been repaired.

### 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 Sprague ranges from 115 to 140 miles per hour, and the ultimate design wind speed is 125 miles per hour. The design speed used varies 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. Sprague has adopted the Connecticut Building Code as its building code.

Connecticut is located in FEMA Zone II regarding maximum expected wind speed. The maximum expected wind speed for a three-second gust is 160 miles per hour. This wind speed could occur as a result of either a hurricane or a tornado in south-central and southeastern Connecticut. The American Society of Civil Engineers recommends that new buildings be designed to withstand this peak three-second gust.

Parts of trees (limbs) or entire tall and older trees may fall during heavy wind events, potentially damaging structures, utility lines, and vehicles. The town has a tree warden, who along with the public works staff is constantly looking for dangerous trees. The tree warden and the public works staff have a tree trimming budget of approximately \$12,000 per year. The group tries to be proactive with aggressive monitoring and prioritizing roads to perform tree maintenance each year. The staff can trim smaller trees, but contracts larger trees out to private trimmers. Despite aggressive trimming, the Public Works Department finds that it does not have the resources to keep up with tree maintenance needs.

The Town has two wood-chippers it uses for debris management. One of those was purchased in the last five years. A brush-disposal operation location has been designated.

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, 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.

All utilities in new subdivisions must be located underground whenever possible in order to mitigate storm-related damage.

During emergencies, the town utilizes the Sayles Elementary School as its primary shelter as described in Section 2.7. The Baltic Fire Department is the secondary shelter and has a 240-hour tank generator. The Fire Department has a small sheltering capacity, but was used as a warming, charging, and showering station during Tropical Storm Irene and Winter Storm Alfred.

The town has not reviewed structures for their susceptibility to wind damage. This should be done moving forward, especially to the large number of homes that pre-date the 1995 building code.

Sprague currently determines sheltering need based upon areas damaged or needing to be evacuated within the town. Under limited emergency conditions, a high percentage of evacuees will seek shelter with friends or relatives rather than go to established shelters. During extended power outages, it is believed that only 10% to 20% of the affected population of town will relocate while most will stay in their homes until power is restored. In the case of a major (Category Three or above) hurricane, it is

likely that the town will depend on state and federal aid to assist in sheltering displaced populations until normalcy is restored.

### Summary

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

### 3.2.3 Vulnerabilities and Risk Assessment

Sprague is located well away from the shoreline; however, the town is still vulnerable to riverine flooding during a hurricane and is as vulnerable as coastal areas to hurricane wind damage. Of particular concern are the blockage of roads and the damage to the electrical power supply from falling trees and tree limbs. Many of the roads are narrow and bordered by private forest land, which is not cleared back from the right-of-way to prevent serious problems resulting from high winds.

#### 3.2.3.1 Hazard Losses

The Town of Sprague did not receive FEMA PA funds in the wake of Tropical Storm Isaias. Since 2012, the town has received \$44,960 in FEMA PA funds for project costs of \$59,947. This was all received for Hurricane Sandy. These funds were received for debris removal and donated resources.

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 damage, debris, and sheltering needs. Table 3-1 through Table 3-3 presents hurricane related damages for the Town of Sprague. 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

Sprague	Return Period	Residential	Commercial	Industrial	Others	Total
	10-year	\$19,670	\$0	\$0	\$0	\$19,670
	20-year	\$368,000	\$4,330	\$2,940	\$3,630	\$378,900
	50-year	\$2,336,700	\$58,460	\$25,950	\$28,120	\$2,449,230
	100-year	\$4,761,860	\$197,860	\$103,960	\$135,780	\$5,199,460
	200-year	\$8,164,140	\$483,060	\$294,110	\$338,910	\$9,280,220
	500-year	15,333,540	\$1,164,160	\$793,280	\$780,690	\$18,071,670
	1,000-year	\$22,581,930	\$1,892,830	\$1,346,910	\$1,135,170	\$26,956,840

Table 3-2 HAZUS-MH Hurricane Related Building Damage

Sprague	Return Period	Minor	Moderate	Severe	Destruction	Total
	10-year	1	0	0	0	1



	20-year	3	0	0	0	3
	50-year	37	3	0	0	40
	100-year	97	11	1	0	109
	200-year	171	28	2	0	201
	500-year	263	63	7	2	335
	1,000-year	318	96	14	5	433

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

Sprague	Return Period	Debris Generated (Tons)	Households Displaced	Individuals Seeking Temporary Shelter
	10-year	5	0	0
	20-year	47	0	0
	50-year	602	0	0
	100-year	1,016	0	0
	200-year	1,633	0	0
	500-year	2,911	4	1
	1,000-year	4,012	10	5

### 3.3. Tornadoes and High Wind Events

#### 3.3.1 Setting and Recent Occurrences

Similar to hurricanes, tropical storms and winter storms, wind damage associated with severe thunder or summer storms and tornadoes has the potential to affect any area of Sprague. 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 town without harming another. Such storms occur in Sprague each year, although hail and direct lightning strikes to areas within Sprague are infrequent. No tornadoes have occurred within the town since the last HMP.

Notable storms that have affected the region since the last HMP include:

- On July 24, 2010, an isolated severe thunderstorm spurred from an approaching cold front and upper level trough. As a result of the intense storm, a tree reportedly fell across Route 97 in Sprague.
- On July 20, 2015, a passing cold front triggered an isolated severe storm in New London County.

Other 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 the Pawcatuck section of Stonington, and another further north in Plainfield. There were reports of uplifted trampolines, downed trees and powerlines, and an uplifted metal shed. This same storm also caused damage in other surrounding communities.

#### 3.3.2 Existing Capabilities

Warning is the most viable and therefore the primary method of existing mitigation for tornadoes and thunderstorm-related hazards in Connecticut. The NOAA National Weather Service issues watches and warnings when severe weather is likely to develop or has developed, respectively. Previous sections outline the need for the town to join the CT Alert's Everbridge emergency notification system to send geographically specific telephone warnings into areas at risk for hazard damage. Section 3.2.2 explains wind regulations and procedures to limit damages associated with wind events in town.

##### 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 Sprague are equally likely to experience the effects of summer storms. Tornadoes are far less frequent than less powerful summer storms and, although they

can cross all areas of town, Sprague is not likely to experience a tornado in any given year. Most thunderstorm damage is caused by straight-line winds exceeding 100 mph.

Experience has shown generally 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 cable 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. Most downed power lines in Sprague are detected quickly and any associated fires are quickly extinguished. Such fires can be extremely dangerous during the summer months during dry and drought conditions.

The town shall continue to look for funding to implement a Reverse 911 system such as the state's Alerts "Everbridge" emergency notification system like other SCCOG municipalities. The town would then have a warning system for all its residents and businessmen and women.

#### *3.3.3.1 Hazard Losses*

Since 2017, there has been no NOAA reports event associated with a severe thunderstorm and wind 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 summer storms and tornadoes, winter storms have the potential to affect any part of Sprague. However, unlike summer storms, winter events and the hazards that result (wind, snow, and ice) have more widespread geographic extent. The entire town is susceptible to winter storms. 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. Some of the larger winter storms described in the 2017 HMP are below.

- During the repeated storms of January and February of 2011, Sprague officials monitored buildings and cleared roofs when necessary. Town officials are unaware of any private structure collapses.
- Winter storm Alfred in October 2011 led to downed trees and electrical outages in different areas of town, which is attributed to wind damage rather than snow load damage. One of the major problems the town faced was the Hanover Sewer Pumping Station which had to be manually pumped by the town every two days. The system serves 60 homes and is not outfitted with a generator.
- 2013 featured exceptional snow events that severely taxed snow removal abilities of towns in the region. The blizzard of 2013 in early February dumped 1-2 feet of snow on the region. Another snowstorm struck the region in mid-March 2013 dumping upwards of 1-2 feet of snow in some parts of the county. Although New London country escaped the 3 foot and higher totals of some areas in the mid-Atlantic, the vast quantity of snow was still a major disruption to the town. Sprague received nearly \$14,000 in federal aid from FEMA to cover storm cleanup costs.

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

### 3.4.2 Existing Capabilities

Existing regulations, codes, ordinances and mitigation measures associated with flooding, wind, and warnings are discussed in Sections 2, 0, and 3.3 respectively. Please refer back to these chapters to review those regulations, codes, ordinances, and mitigation measures applicable to winter storms and nor'easters.

Information for protecting Town residents during cold weather and for mitigating icing and insulating pipes at residences is available at the Town Clerk's area in the Town Hall.

#### Summary

In general, municipal capabilities to mitigate snowstorm damage have remained consistent since the 2017 edition of the hazard mitigation plan was adopted.

### 3.4.3 Vulnerabilities and Risk Assessment

Severe winter storms can produce an array of hazardous weather conditions, including heavy snow, blizzards, freezing rain and ice pellets, flooding, heavy winds, and extreme cold. Further "flood" damage could be caused by flooding from frozen water pipes. Sprague has historically dealt with the issue of fallen trees contributing to the formation of ice jams along the Shetucket River and Beaver Brook. This occurrence has led to a number of ice jams throughout Sprague's past. As a result, the Emergency Management Director (CERT) continuously monitors the two rivers throughout the winter, most closely during winter storms. The town also works closely with the Scotland Dam operators as needed to manage river discharge and ice conditions to reduce the impact and occurrence of ice jams in Sprague.

#### 3.4.3.1 Hazard Losses

There have been no reported winter storm losses for the Town of Sprague since 2017. 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 meter (1.64 feet) of sea level rise above 2001 levels by 2050. CIRCA intends to revisit this estimate and update the planning thresholds in the lifespan of this plan (2023-2028).

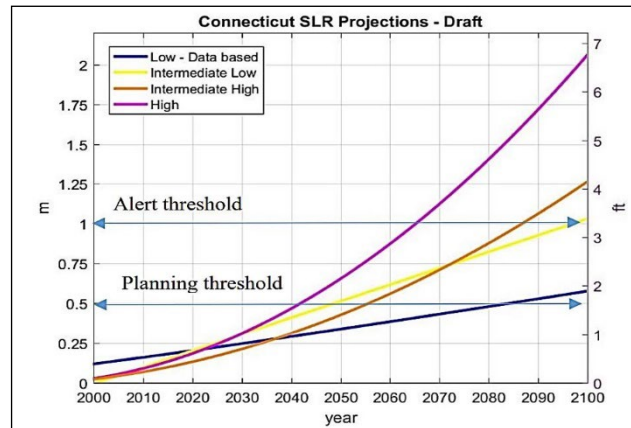


Figure 4-1 Four Localized Sea Level Rise Scenarios for

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

### 4.2. Coastal Flooding

#### 4.2.1 Setting and Recent Occurrences

Sprague is not located along the coastline or along any tidally influenced river. It is also not located in a potential hurricane surge zone. No coastal flooding or storm surge has affected the town since the last HMP. Therefore, Sprague is considered to be immune to the direct effects of coastal flooding and storm surge.

#### 4.2.2 Existing Capabilities

Sprague does not have any regulations in effect to restrict development due to coastal flooding hazards.

#### 4.2.3 Vulnerabilities and Risk Assessment

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

##### 4.2.3.1 Hazard Losses

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

### 4.3. Shoreline Change

#### 4.3.1 Setting and Recent Occurrences

Sprague is not located along the coastline nor is it located in a potential hurricane surge zone. Therefore, the town is not considered to be affected by shoreline change.

#### 4.3.2 Existing Capabilities

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

#### 4.3.3 Vulnerabilities and Risk Assessment

No areas of the town are vulnerable to shoreline change.

##### 4.3.3.1 *Hazard Losses*

There are no reported losses for the Town of Sprague 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

In general, the Town of Sprague experiences flooding, and a significant potential for flooding in Sprague is concentrated in areas along established SFHAs. The areas impacted by overflow of river systems are generally limited to river corridors and floodplains. Indirect flooding that occurs outside floodplains and localized nuisance flooding along tributaries is also a common problem in various parts of Sprague.

The flooding of 2010 continues to be the most significant recent flood event in Town.

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

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

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

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

### 5.2.2 Existing Capabilities

The town attempts to mitigate flood damage and flood hazards by utilizing a wide range of measures: restricting activities in floodprone areas, replacing bridges, promoting flood insurance, acquiring floodprone structures, maintaining drainage systems, through education and outreach, and utilizing warming systems. As noted in Section 2.6, Section 1114 Special Flood Hazard Area (SFHA) Requirements of the *Zoning Regulations*, Sections 6.2 "Subdivision Plan" b) 25, 7.18 "Floodway Encroachments" and 7.19 "Flooding Considerations" in the Subdivision Regulations are the town's articulation of the NFIP regulations. The Zoning regulations require all new construction and substantial improvement to be elevated or floodproofed to or above the base flood elevation. Substantial improvement is defined cumulatively over a one-year period. Sprague's Zoning Regulations also limit any development within 700 feet of the bank of the Shetucket River.

Since the 2012 HMP, a CT DEEP Open Space and Watershed Land Acquisition Grant was used to acquire 100 acres of land for open space preservation. Some of this land is within a floodplain; additionally, maintenance of open space outside of floodplains helps to mitigate stormwater runoff. Four buildings located next to streams have been acquired through foreclosure and torn down in recent years. Two were converted to open space and two to parking lots. These properties did not have a history of flooding.

SFHAs in Sprague are delineated on a Flood Insurance Rate Map (FIRM) and Flood Insurance Study (FIS). The FIRM delineates areas within Sprague that are vulnerable to flooding and was most recently published on July 18, 2011, combined with the remainder of New London County. The majority of the inland watercourses and water bodies in Sprague are mapped as Zone A, while Beaver Brook, the Shetucket River downstream of the Baltic Dam, and the Little River downstream of the Paper Mill Dam are mapped as Zone AE. The First Selectman has reported being dissatisfied with FEMA's maps; It is thought these delineations are inaccurate and do not consider true elevations. For example, it has been found that properties that are built on ground higher than BFE are mapped inside hazard zones.

The Public Works Department cleans and inspects catch basins and culverts at least annually or more often if problems are noted. Culverts, catch basins, and bridges are repaired, upgraded, or added as funding is available and according to need. The Town reports that since 2017 roadways were repaired that washed out in 2021, and the town has continued the catch basin and culvert cleaning program.

The Emergency Management Director and Fire Department accesses weather reports through the National Weather Service. When inland flooding occurs, typically the Emergency Management Director, First Selectman's Office, or the Public Works Department handle the complaints.

The town does not participate in the Community Rating System (CRS) because it has not been cost-effective for the town to retain staff to maintain the CRS program. Information about flood risks, flood mitigation, and FEMA flood insurance is made available through the Town website and newsletters.

#### Summary

In general, municipal capabilities to mitigate flood damage have not increased significantly since the 2017 edition of the hazard mitigation plan was adopted. This is likely because the Town has continued



to increase its capabilities in response to the major flooding of 2010 and continues to operate at this level.

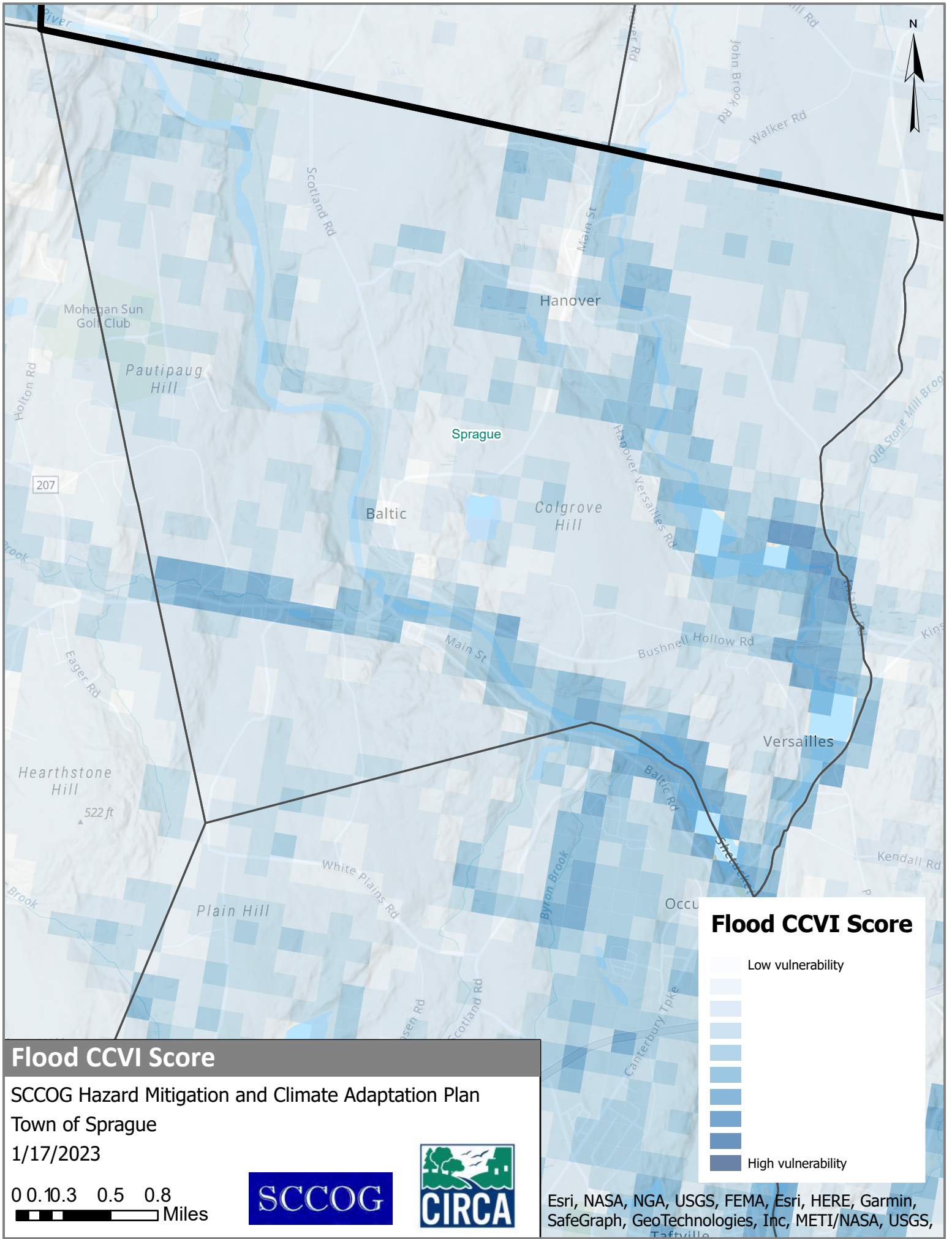
### 5.2.3 Vulnerabilities and Risk Assessment

This section discusses specific areas at risk of flooding within Sprague. Flooding largely due to poor drainage is a persistent hazard in the town and can cause minor infrastructure damage, expedite maintenance, and create nuisance flooding of yards and basements. Figure 5-2 shows the special flood hazard areas in Sprague.

As noted above, the Town of Sprague experiences flooding. Below are some of the historically problematic areas in town.

- Along the Shetucket River and Beaver Brook, fallen trees have historically produced ice jam build-ups which have led to flooding of low-lying areas. As a result, it has been the Emergency Management Director and CERT's responsibility to perform regular inspection of both river bodies to identify when river channel maintenance is needed to prevent ice jam events.
- Poor drainage has caused nuisance flooding along the Shetucket River on River Street, Elm Street, Pautipaug Hill Road and other riverfront areas and along Sunrise Drive and Grandview Drive. The drainage systems on Pautipaug Hill Road are either poorly installed or inadequate systems and can become overwhelmed, which sometimes contributes to flooding along a one mile stretch of the road. The town has identified these areas as a high priority for drainage upgrades. In addition, River Street, Elm Street and other highly developed riverfront areas would likely benefit from the installation of pavers like High Street and Upper High Street have instead of typical asphalt.
- Nuisance flooding occurs along the private roads of Alice Street, Thomas Street, and Amie Street.
- Roadways and residences closest to Little River were most affected by the large-scale rain event of March 2010.

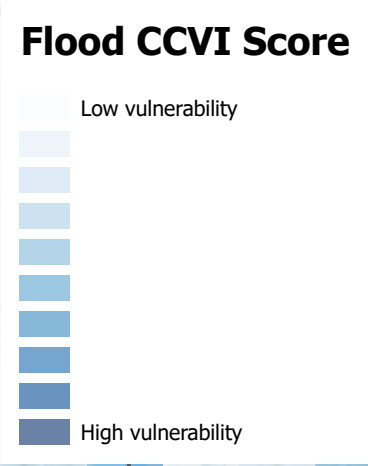
UConn CIRCA has developed a tool to aid in understanding flood vulnerability for communities across the state. This tool, known as the Climate Change Vulnerability Index (CCVI), is comprised of dozens of factors that contribute to a community's flood sensitivity, exposure, adaptive capacity, and ultimately 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 Shetucket River flood exposure.



### Flood CCVI Score

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

0 0.10.3 0.5 0.8  
 Miles



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

## Vulnerability Analysis of Areas along Watercourses

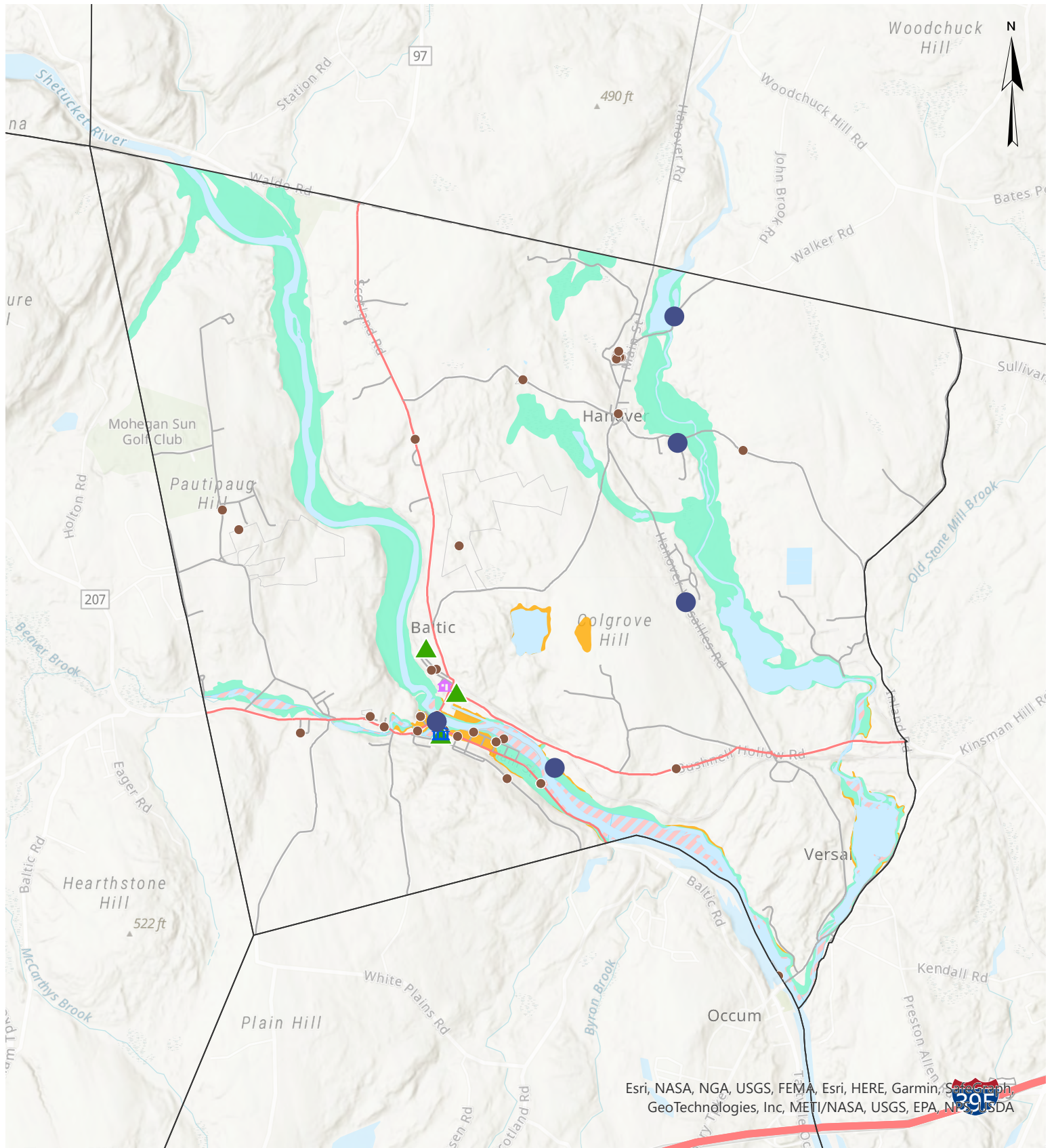
Town officials raised several concerns regarding flooding in Sprague. The rivers that cause the greatest flood hazard are the Shetucket River and Little River. The Little River area was most affected by the March 2010 storm. Flooding problems on Beaver Brook have been reduced in recent years due to the removal of a dam behind the old MS Chambers. Some damage to driveways which span Beaver Brook has occurred in the upstream reaches, but not to homes.

The Shetucket River corridor is the primary area of vulnerability from inland flooding in Sprague. Flooding of the Shetucket River watershed within Sprague has long been a serious concern. The flood of record for the Shetucket River occurred in September 1938 as the result of a hurricane. Severe flooding also occurred along the Shetucket River as the result of Hurricane Diane which occurred on August 19, 1955. Damage from the 1955 flood was reduced by the flood control dam at Mansfield Hollow Lake which was completed in March 1952. Two major floods occurred in Sprague in March 1936 as the result of tropical storms. During the winter, sections of the town along the Shetucket River have flooded due to "ice-damming." Town officials have expressed concern regarding trees and brush that have fallen into the river and may be contributing to the "ice-damming" effect.

Several roads through Sprague have sections that cross floodplains and have a potential to flood during severe storms. A long stretch of Route 97-Main Street/Baltic Road between Second Avenue and Lillibridge Road (in Norwich) is located in the SFHA zone partly located in the floodway. An additional group of other roads are located in flood zone areas in town. Parkwood Road, below the Hanover Reservoir is part of the SFHA as well. Potash Hill Road near Little River and Main Street and Hanover-Versailles Road along Adams Brook also are located in the SFHA and have experienced historical flooding. During flooding events, these flood areas can negatively impact emergency vehicle travel and thus the town's ability to respond to emergencies. Adams Brook on Hanover-Versailles Road had a history of flooding the roadway. Nevertheless, the recently installed drainage appears to have resolved this issue.

The March 2010 large scale rain events and the ensuing flood is the most recent flood of record for Sprague. The damage in town included a collapsed culvert on Inland Road in Versailles. The culvert has since been repaired and the issue resolved.

There have been many historical drainage problems in Hanover. The Town of Sprague has directed a significant amount of funding to drainage upgrades in the village. Nuisance flooding occurs along Pautipaug Hill Road, and along private roads such as Alice Street, Thomas Street, and Amie Street. The private roads do not have any drainage and are in poor condition. Drainage systems on Pautipaug Hill Road are overwhelmed by an existing drainage that performs as though the system was either poorly installed or is inadequate to handle the flow. Homes are occasionally affected by nuisance flooding along a one mile stretch of Pautipaug Hill Road. Sunrise Drive and Grandview Drive are also affected by insufficient drainage-induced flooding.



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

### Critical Facilities and Historic Resources with Flood Zones

### SCCOG Hazard Mitigation and Climate Adaptation Plan

Town of Sprague

Date: 8/1/2022

0 0.25 0.5 0.75 1 Miles



### Legend

- Historic Resources
- 🏠 Senior Housing
- 🏛️ Municipal
- Other Infrastructure and Facilities
- ▲ Shelter or Cooling Center
- 🌊 1% Annual Chance Flood Hazard Area
- 🌊 .2% Annual Chance Flood Hazard Area
- 🌊 Floodway

## Vulnerability Analysis of Private Properties

Based on a review of the Flood Insurance Rate Maps, topographic maps, and aerial photographs, residential structures that are subject to flooding during significant flood events are primarily situated along the Shetucket River. Residential structures along the Shetucket River in the area of Brookside Avenue, River Street, First Avenue, and the section of Route 97-Main Street/Baltic Road from Second Avenue to approximately Lillibridge Road (in Norwich) are in SFHAs.

There are areas of concern for commercial and industrial properties located within the SFHA. One area is located in the downtown area of Sprague where Beaver Brook flows into the Shetucket River. This area has historically had flooding issues and could potentially be impacted by future flooding. Flooding in this area exposes many commercial structures to the possibility of significant damage.

Historically, the majority of the town's industry was located along the banks of the waterways which flow through the town. Currently, the town is less industrialized and thus less exposed to hazards affecting the manufacturing sector. However, Sprague Paper Company still operates several paper mill facilities within the town limits that could be affected by significant flooding.

Based on correspondence with the State of Connecticut NFIP Coordinator, there are no repetitive loss properties (RLPs) located in Sprague. The town recognizes that many private properties may suffer flood damage that is not reported because the structures are not insured under the NFIP. These residents and business owners are likely repairing structures on their own. Flood mitigation as recommended in this plan will likely help many of these properties' owners.

## Vulnerability Analysis of Critical Facilities

A review of the critical public facilities in Sprague shows some public facilities located in SFHAs. Blanchette Field, one of the town's parks is located in the SFHA along with the Sprague Water and Sewer Authority's wellfield. The Sprague Ice Skating Rink is also located in the same SFHA. Sprague constructed a flood control berm adjacent to the Shetucket River to help prohibit the fields from being flooded.

Flooding of the Sprague Water and Sewer Authority's wellfield is a concern to the town. As mentioned above, the wellfield is situated in the Shetucket River's SFHA. The well house is fitted with a generator. The system is considered marginal for the town's demand. The former Baltic Reservoir remains "inactive" because it requires structural upgrading including repairs to the dam. The Baltic Reservoir could once again be utilized as a water supply source.

The list of critical facilities provided by the town was used with Bing Maps aerial photography to locate each critical facility throughout Sprague. Two critical facilities were found to be associated with either a SFHA or 500-year inland floodplains in addition to the various sewer pumping stations and water supply wells. Table 5-1 below lists these critical facilities. These facilities are not believed to have significantly flooded in recent years, although the potential exists for severe flooding.

Table 5-1 Critical Facilities Located Within or Adjacent to Floodplains

Name or Type	Address/Location	Flooding Source
Town Hall/DPW Garage	1 Main Street	Shetucket River
Water & Sewer Treatment Plant	45 Bushnell Hollow Rd	Shetucket River

Flooding of the Gristmill Community Center and Public Library (the same building), located in the Shetucket River SFHA, is also a concern for the Town.

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 Town Hall and Public Works complex in Sprague were included. The assessment determined that the parking lot and lower levels of the facility face current flood risks. Recommendations from that assessment are:

- Eliminate the utility room in the building's basement within the next twenty years.
- Wet floodproof all remaining low areas, or construct a floodwall, over the long term.

5.2.3.1 Hazard Losses

According to NFIP statistics, as of June 30, 2022, the Town of Sprague had a total of 18 flood related losses, with a total of \$128,477 paid towards the claims.

The town also received FEMA Public Assistance (PA) funding for the September 25, 2018, event. The federal share of funds received was \$127,595 which was a portion of the total \$167,469 in project costs. Funds were primarily distributed for Roads and Bridges, with the remainder for state management, and debris removal (Figure 5-3).

FEMA HAZUS-MH 6.0 was used to develop losses associated with the 100-year riverine flood event. Table 5-2 presents flood related damages for the Town of Sprague. Additional HAZUS-generated losses for the town and region can be found in the Multi-Jurisdictional document.

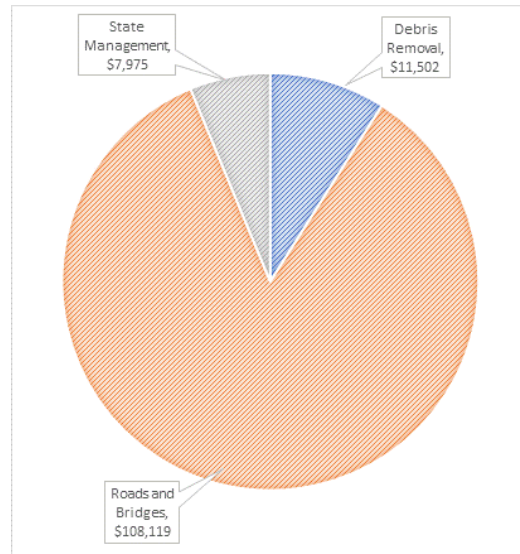


Figure 5-3 September 2018 Storm FEMA Funding Categories

Table 5-2 HAZUS-MH Riverine Flood Related Economic Impacts

Sprague	2022 Results				
	Residential	Commercial	Industrial	Other	Total
<b>Direct</b>					
Building	\$1,710,000	\$180,000	\$150,000	\$10,000	\$2,050,000
Contents	\$820,000	\$510,000	\$260,000	\$90,000	\$1,680,000
Inventory	\$0	\$50,000	\$40,000	\$10,000	\$90,000
Subtotal	\$2,530,000	\$740,000	\$450,000	\$110,000	\$3,820,000
<b>Business Interruption</b>					
Income	\$0	\$610,000	\$10,000	\$70,000	\$690,000
Relocation	\$640,000	\$100,000	\$10,000	\$80,000	\$820,000
Rental Income	\$340,000	\$70,000	\$0	\$30,000	\$440,000
Wage	\$0	\$370,000	\$20,000	\$1,930,000	\$2,320,000
Subtotal	\$980,000	\$1,150,000	\$40,000	\$2,110,000	\$4,270,000
<b>Total</b>	<b>\$3,510,000</b>	<b>\$1,890,000</b>	<b>\$490,000</b>	<b>\$2,220,000</b>	<b>\$8,090,000</b>

## 5.3. Drought

### 5.3.1 Setting and Recent Occurrences

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

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

- **2016** – A statewide drought that lasted almost two years and peaked in 2016, resulted in water conservation efforts throughout the southeastern part of the region, elevated fire risks in some areas, and was noted as the 11<sup>th</sup> 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 Sprague, like many communities, does not have specific regulations geared toward drought mitigation. One of the main purposes of the town’s zoning regulations is, however, to facilitate the adequate provision of water throughout the town.

The town also has an established Natural Resource Protection Zone which has been delineated with the intent of limiting development in sensitive areas including in proximity of surface reservoirs and their watershed. The Watercourse Focus Area Overlay Zone is another district which regulates development with the purpose of protecting groundwater and surface water resources.

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 Sprague 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 Sprague 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.



Sprague is also a small farming community, with several small chicken farms in town. These operations could face challenges associated with irrigation and watering during times of drought as wells and surface water supplies run low.

#### *5.3.3.1 Hazard Losses*

There have been no reported drought losses for the Town of Sprague. 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 floodwater. In addition, a dam failure can cause a chain reaction where the sudden release of floodwater 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. According to town officials, the Flood of 1955 washed out the Shetucket River Dam, which caused damage in town.

The risk of a dam failure affecting Sprague is considered to be moderate as six major dams exist within town along water bodies flowing throughout. The Baltic Reservoir East Dam (Class B) is in satisfactory condition<sup>2</sup> and the CT DEEP has required that the town maintain low water levels in the Baltic Reservoir to not further exacerbate deterioration of the dam. Additionally, the Paper Mill Pond Dam and the Versailles Pond Dam on the Little River may have structural integrity issues, which are being reviewed by the CT DEEP. This all being said, no dam failures have affected the town since the time of the last HMP.

### 5.4.2 Existing Capabilities

The dam safety statutes are codified in Section 22a-401 through 22a-411 inclusive of the Connecticut General Statutes. Sections 22a-409-1 and 22a-409-2 of the Regulations of Connecticut State Agencies have been enacted, which govern the registration, classification, and inspection of dams. Dams must be registered by the owner with the DEEP according to Connecticut Public Act 83-38.

Dam Inspection Regulations require that nearly 700 dams in Connecticut be inspected annually. The DEEP currently prioritizes inspections of those dams that pose the greatest potential threat to downstream persons and properties.

Dams found to be unsafe under the inspection program must be repaired by the owner. Depending on the severity of the identified deficiency, an owner is allowed reasonable time to make the required repairs or remove the dam. If a dam owner fails to make necessary repairs to the subject structure, the DEEP may issue an administrative order requiring the owner to restore the structure to a safe condition and may refer noncompliance with such an order to the Attorney General's Office for enforcement. As a means of last resort, the DEEP Commissioner is empowered by statute to remove or correct, at the expense of the owner, any unsafe structures that present a clear and present danger to public safety.

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<sup>2</sup> <https://nid.sec.usace.army.mil/#/dams/system/CT00469/inspections>

In Connecticut, the owners of Class C dams are required to maintain EAPs. According to Connecticut DEEP Dam Safety files, a DFA was performed on the Hanover Reservoir Dam, the Paper Mill Pond Dam, and the Versailles Pond Dam. The town has developed an EAP for both the Baltic Reservoir East and West Dams. The Town intends to develop an EAP for the Hanover Reservoir Dam.

The recent acquisition of 100 acres of open space by the Town included a minor dam. The Town is working on removal of that dam.

The town has been working with the National Fish and Wildlife Foundation (NFWF) on the removal of Harrington Dam along Beaver Brook. They have also been working with DEEP on the issues at the Paper Mill Pond Dam because of a reported sink hole. In addition, the town is currently undergoing the development of a new EAP for the Paper Mill Pond Dam.

*Table 5-3 Dams Registered with DEEP in the Town of Sprague*

<b>CT Dam#</b>	<b>Dam Name</b>	<b>Dam Class</b>	<b>Owner Type</b>
13308	Rod & Gun Club	A	Private Club
13311	Adams Brook Pond	A	Private
13301	Baltic Reservoir Dam (West)	B	Municipal
13303	Paper Mill Pond Dam	B	Municipal
13304	Versailles Pond Dam	B	Municipal
13306	Harrington Apartments Pond Dam	B	Municipal
13312	Baltic Reservoir Dam (East)	B	Municipal
13302	Hanover Reservoir Dam	C	Municipal

#### Summary

In general, municipal capabilities to mitigate dam failure damage have increased slightly since the 2017 edition of the hazard mitigation plan was adopted. Additionally, changes in the State's regulation of dams have increased Statewide capabilities.

#### 5.4.3 Vulnerabilities and Risk Assessment

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. According to the "Connecticut Dam Safety Program, there were eight CT DEEP-registered dams within Sprague, of which two were Class A, and five were Class B, and one is a Class C. The MS Chambers Mill Dam on Beaver Brook was removed around 1996. While remnants may still remain of the old mill race, the town believes that the dam has been removed from the stream bed. This HMP section primarily discusses the possible effects of failure of both high potential hazard (Class C) dams and significant hazard (Class B) dams.

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

or interruption of the use of service of utilities; damage to primary roadways and railroads; and a significant economic loss. Both hazard classes of dams are regarded as significant in the state of Connecticut.

Town officials have historically raised concerns with several dams in town, some of which are privately owned. In the past, many dams were built to produce power to serve the industrial facilities situated along the town's rivers. The remaining dams include several State of Connecticut-owned dams, and the Paper Mill Pond Dam and Versailles Pond Dam on the Little River, which are owned by the Sprague Paper Company. These dams may have structural integrity issues which are being reviewed by the CT DEEP. The town believes that the owners are investigating rehabilitating these dams as part of potential brownfields cleanup of the mills. The 1955 flood washed out the Shetucket River Dam in, causing damage in Sprague. The risk associated with each of these structures needs to be evaluated in order to ascertain the degree of hazards posed during a significant storm event. The town now owns Hanover Reservoir Dam which is believed to be in good condition.

The impacts related to the Class C and Class B dams in town are described below. The description below is based on information available at the Connecticut DEEP Dam Safety Section. It is noted that the failure of any of the other classes of dams in town could also have impacts on life and property within Sprague, although these are not discussed in favor of the more hazardous classes.

- Baltic Reservoir (West) (No. 13301) and Baltic Reservoir (East) (No. 13312) are two Class B dams located on an unnamed tributary to the Shetucket River, approximately 2,800 feet upstream of the confluence. The reservoir has a maximum storage of 250 acre-feet.

There is no information in the CT DEEP file regarding the dimensions of the west dam. However, the USACE National Inventory of Dams (NID) notes that the west dam has a length of 120 feet and a height of 23 feet. The NID notes that the west dam was constructed in 1900. The west dam on the Baltic Reservoir has been completely rehabilitated in the last five years.

The eastern dam is also known as the "south" or "southernmost" dam. According to the 1989 Inspection Report by Lenard Engineering, Inc., the east dam was constructed in 1908 from reinforced concrete and of a concrete buttress design to create a water supply reservoir. The 1989 report notes that the dam has an approximate length of 163 feet between abutments and a height ranging from 10 to 25 feet. The NID notes that the east dam has a length of 370 feet and a height of 13 feet. An agreement from April 2009 between the Sprague and Wright-Pierce regards the development of an alternative water supply source. The document recommends the preparation of a final design for the rehabilitation of the Baltic reservoir "south" dam. The Town wishes to perform rehabilitation work on this dam but is waiting for the CT DEEP to provide guidance before moving forward.

- Hanover Reservoir (No. 13302) is a Class C dam located on Little River at the southern end of the reservoir. According to the 1980 USACE Phase I Inspection Report, the dam was built in 1900 and is an earthen embankment approximately 26.5 feet in height and 750 feet in length, including a 147-foot masonry spillway. With water level at the top of the impoundment, the dam impounds 400 ac-ft. The top of the embankment is 6.6 feet above the spillway crest and

approximately 30 feet wide with a paved road on it. The 1980 inspection noted that the dam was in poor condition and included a DFA. The structure was visually inspected in March 2010 along with Paper Mill Pond & Versailles Pond after a significant storm event. The inspection noted heavy flows within the channel, a road bridge over the spillway, and approximately four feet of clearance between the water level and bottom of the low chord over the bridge.

The Town of Sprague owns Hanover Reservoir Dam. It is believed to be in good condition, but the Town would like to remove the dam. A study is underway to determine the best course of action moving forward.

- Paper Mill Pond (No. 13303) is a Class B dam located on Little River at the eastern end of the L-shaped reservoir. According to the 1979 USACE Phase I Inspection Report, the dam is a 573-foot long composite rubble masonry, concrete and earth embankment consisting of a 124.5-foot long gravity masonry overflow section, an 84-foot long earth embankment to the right of the overflow section and a 365-foot long earth embankment to the left of the overflow section. The DFA utilized a ½ PMF (test flood) of 11, 200 cfs. The most recent inspection occurred in March 2010 after a large rain event. The CT DEEP inspected this dam along with the Hanover Reservoir and Versailles Pond Dams. This dam may have structural integrity issues.

The dam is currently owned by Fusion, but the dam and the entire Fusion property is currently undergoing foreclosure. The future of this dam is uncertain.

- Versailles Pond (No. 13304) is a Class B dam located on Little River at the southern end of the reservoir. The dam was originally constructed in 1865. According to the 1980 USACE Phase I Inspection Report, the dam was modified in 1920 to have a total length of 400 feet consisting of a 184-foot long broad-crested masonry spillway, a 190-foot long earthen embankment and a 27-foot long sluiceway. The top of the embankment is approximately 20 feet wide, 8.7 feet above the spillway crest, and 23 feet above the streambed of Little River. The flow is directed into a diversion canal under typical flow conditions. The spillway into the canal has a fixed elevation and a total length of 30 feet. The downstream spillway channel is 185 feet long. A concrete fish ladder connects the downstream Little River channel to the spillway channel. The dam was judged to be in poor condition in June 1980. A DFA utilized a ½ PMF of 12,000 cfs. The most recent inspection on file is from March 2010, which was completed by the CT DEEP after a significant storm. The CT DEEP file includes a Long-Term Monitoring and Management Plan. This dam may have structural integrity issues.

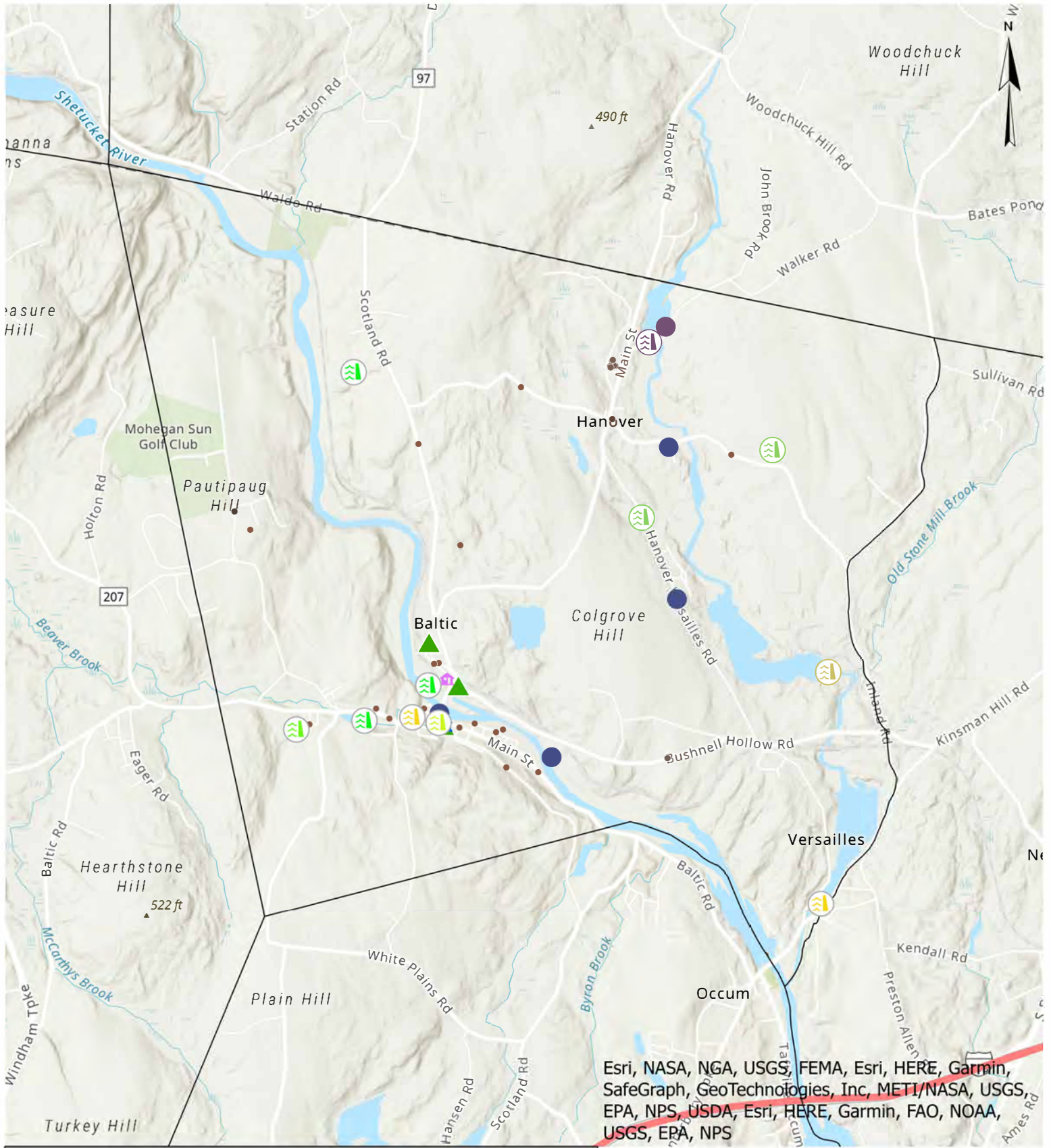
The dam is currently owned by Fusion, but the dam and the entire Fusion property is currently undergoing foreclosure. The future of this dam is uncertain.

- Harrington Apartments Dam (No. 13306) was a Class B dam located on Beaver Brook approximately 350 feet upstream of the West Main Street crossing of the brook. The most recent inspection was completed in April 1989, which noted that the dam was an earth embankment with upstream concrete armor and a downstream vertical masonry wall. It was a run-of-the-river dam, with no significant impoundment upstream. Town officials indicate that

this dam was removed around 1996. While remnants may still remain of the old mill race, the Town believes that the dam has been removed from the stream.

#### *5.4.3.1 Hazard Losses*

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



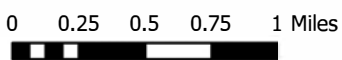
Esri, NASA, NGA, USGS, FEMA, Esri, HERE, Garmin, SafeGraph, GeoTechnologies, Inc, METI/NASA, USGS, EPA, NPS, USDA, Esri, HERE, Garmin, FAO, NOAA, USGS, EPA, NPS

### Dams and Dam Failure Inundation Areas

Southeastern Connecticut Council of Governments

Town of Sprague

Date: 2/23/2023



### Legend

#### Dams

- Unknown/Unclassified
- A
- AA
- B
- C

- Historic Resources
- Senior Housing
- Municipal
- Other Infrastructure and Facilities
- Shelter or Cooling Center
- Dam Failure Inundation Area

## 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.<sup>3</sup>

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 and Recent Occurrences

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	<b>93</b>	89	<b>94</b>	88	<b>92</b>	87	89	86	89
2018	80	<b>91</b>	87	<b>90</b>	89	<b>101</b>	91	<b>94</b>	90	92
2019	83	85	88	<b>91</b>	94	<b>96</b>	88	<b>91</b>	87	84
2020	75	81	82	<b>91</b>	<b>92</b>	<b>96</b>	89	<b>92</b>	87	87
2021	88	87	86	<b>96</b>	86	<b>94</b>	88	<b>96</b>	82	85
2022	<b>93</b>	<b>92</b>	85	<b>92</b>	<b>91</b>	<b>96</b>	<b>91</b>	<b>94</b>	<b>94</b>	85

GNL = Groton New London station & NPU = Norwich Public Utilities station

<sup>3</sup> <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 Sprague has identified the Town Hall and Elementary School as cooling centers in town, with the Fire House being a secondary option if needed. In the event of a projected heat event or heat wave, the Town is prepared to open up the cooling centers for resident cooling 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 Sprague. The elderly populations in town are more vulnerable to extreme heat events, particularly when in home cooling is not available. In addition, there is concern over the ability to cool the elderly living facility in the event of a heat wave coinciding with a power outage. Also, those in town with certain health conditions may also be more vulnerable to the health factors associated with extreme temperatures.

Similar to drought, the livestock operations may be vulnerable during these heat events. Farm owners may find keeping livestock cool during extreme heat a challenge if fans or other methods are unavailable.

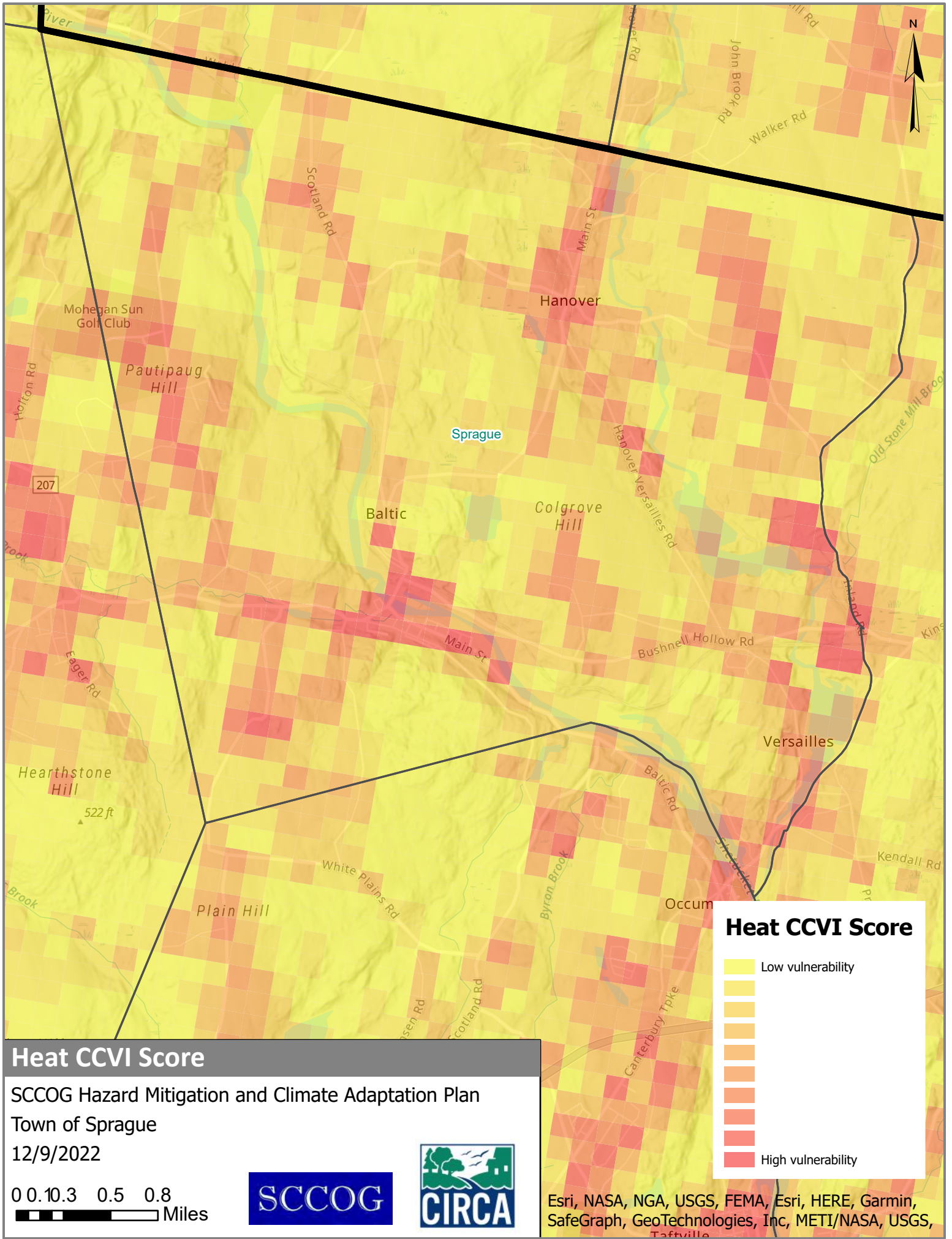
UConn CIRCA has developed a tool to aid in understanding extreme heat vulnerability for communities across the state. This tool, known as the Climate Change Vulnerability Index (CCVI), is comprised of dozens of factors that contribute to a community's heat sensitivity, exposure, adaptive capacity, and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

Heat exposure is relatively low across most of Sprague, although pockets of higher exposure exist at the railroad station near Inland Road as well as at the intersection of Rt 207 and Rt 97, due to the clustered buildings and impervious surfaces in these areas. Both social and built factors contribute to heat sensitivity in Sprague, resulting in moderate scores. Three potential cooling centers and abundant vegetated surfaces result in relatively robust adaptive capacity. Therefore, the overall heat vulnerability for Sprague is low to moderate depending on the location.

### 6.2.3.1 Hazard Losses

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





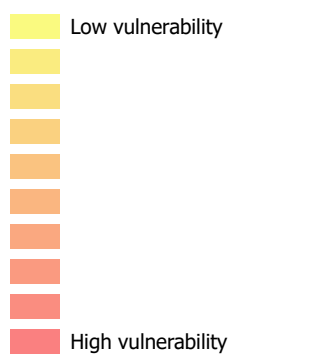
## Heat CCVI Score

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

0 0.10.3 0.5 0.8  
 Miles



### Heat CCVI Score



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

## 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 lightly developed areas. According to Sprague officials, there are no areas in town at a high risk for wildfires, however some areas are more difficult to access than others.

### 6.3.2 Existing Capabilities

Monitoring of potential fire conditions is an important part of mitigation. The DEEP Forestry Division uses the rainfall data recorded by the Automated Flood Warning system to compile forest fire probability forecasts. This allows the DEEP and Sprague to monitor the drier areas of Connecticut to be prepared for forest fire conditions. The town can access this information on the internet.

Existing mitigation for wildland fire control is typically focused on Fire Department (entirely volunteer) training and maintaining an adequate supply of equipment. The Department moves to the location of the fire as quickly as possible. The town recently moved old fire hydrants from private backyards to the street sides. This was primarily done in the village of Baltic where hydrants were originally installed and associated with mill housing approximately a century ago. The moving process is expected to reduce the potential for unnoticed leaks in the water system. In response to areas difficult to reach, the Fire Department has an off-road truck and an ATV which make access possible to the ample amount of forested land in town.

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." Sprague has designated an Open Burning Official. 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 remained consistent since the 2017 edition of the hazard mitigation plan was adopted.

### 6.3.3 Vulnerabilities and Risk Assessment

As discussed above, the town is in the middle of relocating fire hydrants in the village of Baltic to reduce the potential for leaks in the water system and the town has an off-road truck and an ATV which allow Sprague the ability to access otherwise inaccessible areas. These vehicles improve access to the few areas which are inaccessible to standard firefighting vehicles.

There are some dead-end and private roads in town which present difficult access for fire trucks. However, in most cases, trucks are able to turn around in private driveways. In terms of the built areas of Sprague, the highest risk to town is the areas in the village of Baltic, particularly the lower end of High

Street, where residences are close together. In some instances, homes can be as little as six inches apart in the village.

However, the Baltic Fire Department, comprised entirely of volunteers, aims to reach fires as fast as possible, even in outlying areas where nine dry hydrants are located. The Fire Department tries to extinguish fires as fast as possible.

#### *6.3.3.1 Hazard Losses*

There are no reported losses for the Town of Sprague 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 Sprague. However, it is very unlikely that the town would be at the epicenter of such a damaging earthquake. No major earthquakes have affected Sprague since the last HMP.

#### 7.2.2 Existing Capabilities

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

Due to the infrequent nature of damaging earthquakes, land use policies in Lisbon do not directly address earthquake hazards. A specific survey regarding all critical facilities and infrastructures has not been performed.

#### 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

Unlike seismic activity in California, earthquakes in Connecticut are not associated with specific known active faults. Bedrock in Connecticut and New England in general is highly capable of transmitting seismic energy.

The built environment in Connecticut includes old, non-reinforced masonry that is not seismically designed. Those who live or work in non-reinforced masonry buildings, especially those built on filled land or unstable soils are at the highest risk for injury due to the occurrence of an earthquake.

Approximately 28% or 2,493 acres of the town is underlain by stratified drift which includes alluvium, sand, gravel, fines, swam, and surficial materials beneath water. The remaining approximately 6,348 acres of the 8,841 acres (approximately 72%) are underlain by till. Structures in the areas of stratified drift are at an increased risk from earthquakes due to amplification of seismic energy and/or collapse. The areas underlain by stratified drift are typically associated with water bodies. In Sprague, the areas underlain by stratified drift are mostly the areas surrounding Beaver Brook, the Shetucket River, Little River, Adams Brook, and their tributaries.

The best mitigation for future development in areas of sandy material is the application of the most stringent building codes such as those in the Connecticut Building Codes or, wherever the town deems necessary, the prohibition of new construction. The areas that are not at increased risk during an earthquake due to unstable soils are the majority of Sprague underlain by glacial till.

Areas of steep slopes can collapse during an earthquake, creating landslides. Areas of steep slopes in Sprague are typically near the major waterways including the Shetucket River, Beaver Brook, and Little River. However, officials do not report any historical issues with landslides or slumping soils along the face of hillsides in town.

Seismic activity can also break utility lines, such as water mains and 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.

#### 7.2.4 Hazard Losses

There are no reported losses for the Town of Sprague 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*

Sprague	Residential	Commercial	Industrial	Others	Total
	\$22,950,000	\$18,710,000	\$10,400,000	\$12,600,000	64,660,000

## 8. Mitigation Strategies and Actions

### 8.1. Status of Mitigation Strategies and Actions

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

#	Mitigation Actions and Strategies for Sprague 2016 - 2021	Status	Status Details
1	Resolve and utilize the Reverse 9-1-1 system to telephone warnings into affected areas, and add DFIRM floodplain areas to the database	Carry Forward	Town has reportedly not used Reverse 911 in several years. Prior concerns with emergency warning were relative to upstream dams. However, close communication with dam operators has reduced flood damage risks in Sprague. Residents likely rely on National Weather Service warnings and other organizations. Nevertheless, the Town would like to keep this action on their radar for future needs.
2	Integrate additional elements of this HMP into the Plan of Conservation and Development during the next update	Carry Forward	POCD update was complete in 2018, but the next update will likely need additional hazard-related elements.
3	Complete a study of the Hanover Reservoir determining whether dredging is necessary.	Complete	The study has been complete. This impoundment may be private property, although the town may own part of the dam/roadway. The ownership question is a challenge. <i>Create a revised action to acknowledge the results of the study.</i>
4	Eliminate the utility room in the basement of the Public Works/Town Hall Complex and relocate utilities to a higher location.	Carry Forward	Carry forward – The last major flood to impact the town was in 1994 and was related to an ice jam and Scotland and Mansfield Hollow Dams. There is presently good communication between the town and upstream dam owners as noted above for #1 and below this table. Though there have been few floods recently, the Town would like to carry this forward given that the facility is in a flood zone.
5	Incorporate wet floodproofing of remaining low areas in the Public Works/Town Hall Complex, or construction of a floodwall protecting that site, into the Town's long term planning by including such plans in the POCD and the Capital Improvements Plan.	Carry Forward	See action #4
6	Work with CT DEEP to ensure that the owners of high hazard dams have current EOPs and keep local copies	Carry Forward with Revisions	This is likely a capability but keep or revise this action due to the dam projects mentioned in the Unique Challenges section below. Revise to additionally acknowledge the dams recently acquired by the Town.

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

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

- Eliminate the utility room in the basement of the Public Works/Town Hall Complex and relocate utilities to a higher location, as recommended in the Southeastern Connecticut Critical Facilities Assessment.
- Incorporate wet floodproofing of remaining low areas in the Public Works/Town Hall Complex, or construction of a floodwall protecting that site, into the Town's long term planning by including such plans in the POCD (2028) and the Capital Improvements Plan.
- When replacing or upgrading aged sewers and sewer treatment infrastructure, incorporate standby power and hardening techniques to make them more resilient. This action should be achieved by adding appropriate narratives to the POCD (2028) and capital improvement plans.

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

- Ensure that the cooling centers (Town Hall, school, and fire department) have appropriate standby power to operate AC and are accessible using transit or alternate transportation options.

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

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

Number	Hazard Mitigation and Climate Adaptation Actions	Hazard Mitigation and Climate Adaptation Goal	Type of Action	Responsible Department	Approx. Cost Range	Potential Funding Sources	Timeframe	Priority	PERSISTS Score	STAPLEE Score	PERSISTS x STAPLEE =
SP1	Ensure that the cooling centers (Town Hall, school, and fire department) have appropriate standby power to operate AC and are accessible using transit or alternate transportation options.	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
SP2	Replace or augment the standby power at Shetucket Village senior housing to allow for operation of the AC system.	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	15	6	90
SP3	Eliminate the utility room in the basement of the Public Works/Town Hall Complex and relocate utilities to a higher location, as recommended 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	Building Official	\$100,000 - \$500,000	FEMA HMA; Municipal CIP Budget	7/2024 - 6/2026	Medium	16	8	128
SP4	Incorporate wet floodproofing of remaining low areas in the Public Works/Town Hall Complex, or construction of a floodwall protecting that site, into the Town's long term planning by including such plans in the POCD (2028) and the Capital Improvements Plan.	Reduce flood and erosion risks by reducing vulnerabilities and consequences, even as climate change increases frequency and severity of floods.	Property Protection	Building Official	\$100,000 - \$500,000	FEMA HMA; Municipal CIP Budget	7/2026 - 6/2028	Medium	16	8	128
SP5	When replacing or upgrading aged sewers and sewer treatment infrastructure, incorporate standby power and hardening techniques to make them more resilient. This action should be achieved by adding appropriate narratives to the POCD (2028) and capital improvement plans.	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	\$100,000 - \$500,000	CWSRF; FEMA HMA	7/2026 - 6/2028	Medium	16	8	128



Number	Hazard Mitigation and Climate Adaptation Actions	Hazard Mitigation and Climate Adaptation Goal	Type of Action	Responsible Department	Approx. Cost Range	Potential Funding Sources	Timeframe	Priority	PERISTS Score	STAPLEE Score	PERISTS x STAPLEE =
SP6	Utilize the Reverse 9-1-1 system to telephone warnings into affected areas and add DFIRM floodplain areas to the database.	Reduce flood and erosion risks by reducing vulnerabilities and consequences, even as climate change increases frequency and severity of floods.	Preparedness & Emergency Response	Emergency Management	\$0 - \$10,000	Municipal Operating Budget	7/2023 - 6/2024	Medium	14	5	70
SP7	Integrate additional elements of this HMCAP into the Plan of Conservation and Development during the next update (2028).	More than one goal	More than one category	Office of the Chief Elected Official	\$0 - \$10,000	Municipal Operating Budget	7/2027 - 6/2028	High	14	5	70
SP8	Partner with CT DEEP to ensure that the owners of high hazard dams have current EAPs and maintain local copies that can be easily reviewed before or during severe precipitation events. Ensure that changes in dam ownership are reflected in EAPs.	Reduce flood and erosion risks by reducing vulnerabilities and consequences, even as climate change increases frequency and severity of floods.	Preparedness & Emergency Response	Emergency Management	\$0 - \$10,000	Municipal Operating Budget	7/2023 - 6/2024	High	14	6	84
SP9	In coordination with CT DEEP, complete upgrades and repairs to the Paper Mill Pond Dam, which was acquired by the Town in recent years.	Reduce flood and erosion risks by reducing vulnerabilities and consequences, even as climate change increases frequency and severity of floods.	Structural Projects	Office of the Chief Elected Official	>\$1M	FEMA HHPD	7/2024 - 6/2026	High	14	4	56
SP10	Develop a new/initial EAP for the Paper Mill Pond Dam, which was acquired by the Town.	Reduce flood and erosion risks by reducing vulnerabilities and consequences, even as climate change increases frequency and severity of floods.	Preparedness & Emergency Response	Emergency Management	\$25,000 - \$50,000	Municipal CIP Budget	7/2023 - 6/2024	High	14	4	56
SP11	Require floodplain manager and land use staff to take free training at <a href="https://portal.ct.gov/DEEP/P2/Chemical-Management-and-Climate-Resilience/Chemical-">https://portal.ct.gov/DEEP/P2/Chemical-Management-and-Climate-Resilience/Chemical-</a>	Reduce flood and erosion risks by reducing vulnerabilities and consequences, even as climate change increases	Education & Awareness	Land Use Staff	\$0 - \$10,000	Municipal Operating Budget	7/2023 - 12/2023	Low	14	6	84

Number	Hazard Mitigation and Climate Adaptation Actions	Hazard Mitigation and Climate Adaptation Goal	Type of Action	Responsible Department	Approx. Cost Range	Potential Funding Sources	Timeframe	Priority	PERISTS Score	STAPLEE Score	PERISTS x STAPLEE =
	Management-and-Climate-Resilience to reduce risks of spills from businesses during floods.	frequency and severity of floods.									