



15 Glastonbury

Community Overview

The Town of Glastonbury encompasses 51.37 square miles with an estimated population of over 34,000 people. The elevation ranges from about 80 to 800 feet. The Town lies primarily in the Main Stem of the Connecticut River drainage basin while a small portion in the northeast corner of Glastonbury drains to the Hockanum Watershed. In addition to the Connecticut River which flows along the western boundary, main watercourses include Hubbard, Roaring, Salmon and Slab Gut Brooks. Major transportation routes through Glastonbury include Routes 2, 3, 17, 83 and 94. Glastonbury’s major industries include insurance and financial services, technology and banking, computer services, medical and adult care facilities, agriculture, as well as retail. Multiple new developments are underway as population continues to grow. A 250-unit apartment complex has been built off New London Turnpike, a 145-unit complex is under construction on Hebron Avenue, and construction on 100 units on Glastonbury Boulevard is expected to begin soon. A number of new renovations and redevelopments are underway downtown, including 30,000 square feet of commercial space under construction.

Critical Facilities

Critical Facilities throughout the Capitol Region are listed in Appendix B. A number of Glastonbury critical facilities are listed here.

The Glastonbury Emergency Operations Center (EOC) is located in the Town Hall. The secondary EOC is the police department (formerly the primary EOC location). During emergencies, Glastonbury EOC personnel prefer to be out in the community, rather than stationed at the EOC. The Town funds four fire stations, but the crews are volunteer. All four have standby emergency generators.

The High School is the primary shelter. The Community Center serves as the secondary shelter. Emergency supplies are kept at the Facilities Maintenance Barn located adjacent to the EOC, Town Hall, and Police Department; an emergency generator was being installed at the Facilities Maintenance barn as this HMP was being developed. Numerous charging and warming centers are dispersed throughout the town, given its large size.

Table 15-1: Critical Facilities, Glastonbury

Facility	Shelter	Generator
Town Hall (EOC)		X
Police Department (Secondary EOC)		X
Glastonbury High School	Primary	X
Glastonbury East Hartford Magnet School		X
Glastonbury Community Center	Secondary	X
Facilities Maintenance Barn (Emergency Supply Storage)		X
Four Volunteer Fire Stations		X
Eight (8) Sewage Pumping Stations		X

Facility	Shelter	Generator
Center Village		X
Village Green & Knox Lane Annex		X
Herbert T. Clark Housing		X
Genesis Health Care Facility		X
Mountain Laurel Health Care Facility		X
Naubuc Green		X
Ambulance Facility		X

Capabilities

Hazard mitigation is addressed specifically in Glastonbury’s Plan of Conservation and Development.

Nearly 92% of land at risk of flooding in Glastonbury is in the Flood Zone or otherwise zoned for resource protection /agriculture, recreation or public use. Development is generally restricted from the floodplain. The Town adopted enhanced Inland Wetlands and Watercourses Regulations in 2010 which could reduce its overall level of vulnerability.

Glastonbury coordinates tree-trimming near powerlines and power outage prevention and response with the regional energy provider (Eversource). This relationship has been positive and trimming efforts have been effective at minimizing outages. Some work has been controversial, as property owners near the lines are upset about the extent of clearing.

New Capabilities

Glastonbury has acquired emergency generators using taxpayer funds. A STEAP grant for \$300,000 (approximate) provided funding for transitioning the Facilities Maintenance Barn to an emergency preparedness support facility.

The Town has undertaken a lot of work over the past few years in response to the storms of 2011. They have found it helpful to post written and electronic messages in town during events.

Several bridge and drainage projects have been completed by the Town since the previous HMP. A major drainage project underway at Tryon Street and Dug Road should reduce flooding in South Glastonbury. The Blackledge River Dam has been removed.

Glastonbury has a Fire Marshal; this official requires construction of new cisterns or dry hydrants as is deemed necessary.

Glastonbury was awarded the Silver Certification within the SustainableCT program in October 2018.



Challenges

Challenges Overview

Glastonbury has experienced disruptions and damages due to flooding and severe storms. Ten percent of Glastonbury's land area is located in the 100-year floodplain.

The April, 2017 winter storm was notable for its wind and tree damage.

Droughts tend not to be a significant hazard in Glastonbury; however, some residents on private wells use significant amounts of water for turf irrigation, which can have an impact on groundwater supplies. Residents may not understand possible adverse outcomes. Efforts by the Town to provide public education concerning drought conditions continue, as applicable.

The Mill Street Dam, Addison Pond Dam, and Buckingham Reservoir Dam are all dams of note within the Town.

Hazard Losses

The economic losses faced by the community from natural hazards can be estimated by reviewing historic, and modeling future, loss figures. Loss estimates are summarized below.

Historic FEMA Payments

FEMA reimburses communities for hazard losses through programs including Public Assistance (PA) and the National Flood Insurance Program (NFIP). Combining PA and private flood insurance payments can give an estimate for total losses to a community.

Since 1978, the NFIP has paid 47 property damage claims in Glastonbury totaling \$161,877. Glastonbury has not had any Repetitive Loss (RL) Property claims.

Total PA reimbursements to the community were as follows:

- Flood Events: \$14,900 (\$784 annually)
- Hurricane Events: \$144,778 (\$7,620 annually)
- Winter Storm Events: \$4,097,815 (\$215,674 annually)

These are summarized in the tables below.

Table 15-2: Flood Event PA Reimbursements, Glastonbury

Incident	Sep 1999	Oct 2005
Declaration	9/23/1999	12/16/2005
Disaster No.	1302	1619
Entity	FEMA PA Reimbursement	
State	\$1,597	\$1,980
Municipal	\$0	\$11,323



Nonprofit	\$0	\$0
Total	\$1,597	\$13,303
Annualized	\$84	\$700

Table 15-3: Hurricane Wind Event PA Reimbursements, Glastonbury

Incident	Aug - Sep 2011 (T.S. Irene)
Declaration	9/2/2011
Disaster #	4023
Entity	FEMA PA Reimbursement
State	\$1,514
Municipal	\$143,264
Nonprofit	\$0
Total	\$144,778
Annualized	\$7,620

Table 15-4: Winter Storm PA Reimbursements, Glastonbury

Incident	Mar 2003	Dec 2003	Jan 2005	Feb 2006	Jan 2011	Oct 2011	Feb 2013
Declaration	3/11/03	1/15/04	2/17/05	5/2/06	3/3/11	11/17/11	3/21/13
Disaster #	3176	3192	3200	3266	1958	4046	4106
Entity	FEMA PA Reimbursement						
State	\$29,850	\$26,760	\$35,304	\$42,851	\$37,335	\$15,397	\$72,555
Municipal	\$79,400	\$112,790	\$117,653	\$126,722	\$155,942	\$2,973,619	\$271,636
Nonprofit	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Total	\$109,251	\$139,550	\$152,957	\$169,573	\$193,277	\$2,989,016	\$344,191
Annualized	\$5,750	\$7,345	\$8,050	\$8,925	\$10,172	\$157,317	\$18,115

National Centers for Environmental Information Losses

The table below summarizes events in the National Centers for Environmental Information (NCEI) severe storm database that were specifically noted as having impacted the community since 2012.

Table 15-5: NCEI Database Losses since 2012, Glastonbury

Date	Event	Property Damage
8/10/2012	Microburst	\$110,000
9/18/2012	Thunderstorm Wind	\$5,000
6/23/2015	Thunderstorm Wind	\$15,000
2/25/2016	Thunderstorm Wind	\$5,000
2/25/2016	Thunderstorm Wind	\$5,000
8/11/2016	Thunderstorm Wind	\$95,000
8/11/2016	Flood	\$0



Date	Event	Property Damage
8/2/2017	Hail	\$0
Total Thunderstorm		\$235,000
Total Flood		\$0

NCEI losses under other event categories (such as drought, high wind, flooding, and winter storms) were not specifically noted as impacting this community, though they did impact Hartford County and nearby towns. NCEI losses are reported in Section II of this Plan.

HAZUS-MH Losses

CRCOG used FEMA’s Hazus-MH model to analyze the risks that the community might face from flooding, hurricanes, and earthquakes. The model estimates economic losses to the town due to damage to buildings and building contents, as well as other economic disruptions. Both residential and commercial structures are addressed. Losses from different hazards are summarized below. Where available, estimates from the previous and current versions of the HMP are provided side-by-side; differences between the two may have been caused by a combination of the following:

- Changes in methodology: such as hazard zone mapping
- Changes in data: such as population and property values
- Changes in the model: this HMP utilized Hazus-MH version 4.0 rather than 2.1
- Other factors: inherent in a complex software like Hazus-MH

More details are available in the Multi-Jurisdictional HMP. Ultimately, changes in the loss estimates reflect the reality that small differences in hazard event features can have a significant impact on losses incurred.

Table 15-6: Estimated Damages to Glastonbury from a 1% Annual-Chance Flood

Loss Type	2014 Results	2018 Results
Households Displaced	278	441
People Needing Shelter	456	658
Buildings at Least Moderately Damaged	10	2
Residential Building & Content Losses	\$13,590,000	\$44,246,359
Other Building & Content Losses	\$22,010,000	\$48,905,896
Total Building & Content Loss	\$35,600,000	\$93,152,255
Total Business Interruption Losses	\$120,000	\$1,772,302
TOTAL	\$35,720,000	\$94,924,557



Table 15-7: Estimated Damages to Glastonbury from a 1% Annual-Chance Hurricane

Loss Type	2014 Results (1938 event)	2018 Results (1% track)
Buildings at Least Moderately Damaged	1,342	1
Buildings Completely Damaged	78	0
Total Debris Generated (tons)	90,099	17411
Truckloads (at 25 tons/truck) of building debris	724	696
Economic Losses		
Residential Building & Content Losses	\$144,360,000	\$20,999,437
Other Building & Content Losses	\$42,373,000	\$1,607,988
Total Building & Content Loss	186,733,000	\$22,607,425
Total Business Interruption Losses	\$24,173,000	\$977,172
TOTAL LOSSES	\$210,906,000	\$23,584,597

Losses were calculated from a modeled probabilistic earthquake (1% annual-chance of occurrence), as well as for four specific scenarios with epicenters around Connecticut.

Table 15-8: Estimated Damages to Glastonbury from a Probabilistic Earthquake

Loss Type	2018 Results
Wage Loss	\$6,990
Rent Loss	\$7,301
Relocation Loss	\$12,208
Income Loss	\$5,343
Inventory Loss	\$870
Total Business Disruption	\$32,711
Structural Loss	\$23,909
Non-Structural Loss	\$64,940
Total Building Loss	\$88,849
Total Content Loss	\$27,953
TOTAL LOSSES	\$149,513

Table 15-9: Estimated Damages to Glastonbury from Modeled Earthquake Scenarios

Epicenter Location	Magnitude	Estimated Total Losses
East Haddam	6.4	\$1,806,399.69
Haddam	5.7	\$637,761.74
Portland	5.7	\$3,078,672.58
Stamford	5.7	\$14,376.15

Average Annualized Losses

Average Annualized Loss (AAL) figures are useful tools for comparison of the risks faced from different hazards with different likelihoods of occurring in a given time period. AAL estimates were prepared for each natural hazard that may impact the community based on the methodologies discussed in Section II of the Multi-Jurisdictional HMP. Dam failure, drought, tornado, and wildfire losses were sourced from the 2014 Connecticut Natural Hazard Mitigation Plan Update, with dam failure data supplemented by the National Performance of Dams



Program and the Connecticut Department of Energy & Environmental Protection. Earthquake and hurricane losses were calculated in HAZUS-MH. Losses for flooding came from NFIP claims, for winter storms from Public Assistance Reimbursements, and for thunderstorms from the NCEI database. These are presented in the table below in dollars per year. Note that Hurricanes and Tropical Storms represent the largest share of total annualized losses.

Table 15-10: Average Annualized Losses, Glastonbury

Dam Failure	Drought	Earthquakes	Flooding	Hurricanes and Tropical Storms	Severe Winter Storms	Thunderstorms	Tornadoes	Wildfires	Total
\$62	\$0	\$149,513	\$5,044	\$2,158,179	\$215,674	\$4,572	\$505,108	\$9,530	\$3,047,682

Losses Summary

A review of the above loss estimates demonstrates that the Town of Glastonbury has experienced significant expenses as a result of natural hazards, and is at risk for additional losses if some of the less-frequent events were to occur. These actual and potential losses justify hazard mitigation actions to reduce losses in the future.

Mitigation Strategies and Actions

Status of Previous Mitigation Strategies and Actions

The community reviewed the mitigation actions proposed in the 2014-2019 Capitol Region Natural Hazards Mitigation Plan Update and determined the status of each. That information is included in the table below.

Table 15-11: Status of Previous Mitigation Strategies and Actions, Glastonbury

Action #	Action	Notes	Status
GOAL: REDUCE LOSS OF LIFE, PROPERTY AND ECONOMIC CONSEQUENCES FROM NATURAL DISASTERS SUCH AS WINTER STORMS, HURRICANES AND FLOODING.			
Objective 1: Improve ability to clear roadways as a result of storm events, which may be impassable due to snow, flooding or debris in order to improve emergency access and to assist in expediting utility restoration as required.			
1.1	Secure contractual tree removal services and equipment prior to storm response and cleanup.	This action has been completed.	Completed
1.2	Procure additional Town equipment to expedite cleanup operations as a result of storm events which include large scale snow blowing/removal and debris collection equipment.	Current resources are believed to be sufficient at this time.	Drop
Objective 2: Expand the Town's tree maintenance program for tree trimming located within public right of ways to mitigate the delay in the restoration process of utilities, such as electricity, natural gas and public water service.			
2.1	Increase the Town budget for the trimming and removal of potentially hazardous trees.	The Town has not been able to increase the budget, but current resources are believed sufficient at this time. Drop this action.	Drop



Action #	Action	Notes	Status
Objective 3: Improve Town’s ability to provide emergency shelter for residents and small pets.			
3.1	Increase inventory of emergency response supplies and acquire storage for same (food, water, cots, oxygen cylinders, signs, electronic devices (charging stations) etc.)	This action has been completed.	Completed
Objective 4: Continue to enhance capabilities to track high risk population and provide emergency notification systems to reach isolated/special needs population.			
4.1	Continue voluntary registry and classifications of those individuals who may require special assistance in an emergency.	This is an ongoing effort. This is a capability	Capability
4.2	Develop and implement messaging system to provide early alert system to isolated and high risk population utilizing Everbridge (reverse 911), Board of Education notification system and social media.	Messaging systems have been setup using Reverse 911, social media, and electronic message boards. This action is complete.	Completed
Objective 5: Enhance public information efforts and promote public education for residents and businesses of Glastonbury as to how to prepare for a natural disaster and the necessary precautions that should be taken to protect their assets during an extended power outage.			
5.1	Develop materials instructing residents on measures to take care of their own properties (bleeding water lines etc.), and services offered by the Town. Post information on town website, social media and produce for distribution in welcome packets, with tax mailings and through other periodic offerings. Create checklist for public to utilize during emergencies.	This action has been completed.	Completed
5.2	Identify and purchase generator/battery powered messaging signs to provide important safety emergency information to public during times of extended power outages.	This action has been completed.	Completed
Objective 6: Establish state of the art Emergency Operations Center (EOC) with secondary and backup EOC for redundancy.			
6.1	Relocate EOC to Academy Building from Police Training Room to improve overall operational efficiencies. Police Training Room will be utilized as backup EOC. Identify and purchase supplemental equipment/enhancements to operate effectively (GIS software for accessing/monitoring damage reports, technology, phone/alert systems, storage). In addition to the primary and secondary EOC locations an additional contingency to utilize Fire Company #3 and #4 may be required based on specific extenuating needs.	This action has been completed.	Completed
Objective 7: Enhance overall functionality of Town operations and specified business community during extended power outages.			
7.1	Installation of a new emergency generator at the Community Center as this facility can be utilized as an emergency shelter. In addition to providing emergency power to the compressed natural gas filing station located at the Community Center which provides fuel for vehicles within the Town fleet.	This action has been completed.	Completed



Action #	Action	Notes	Status
7.2	Purchase mobile generators to be utilized as primary and backup power sources for Town operations.	This action has been completed.	Completed
7.3	Replace inoperable generator at Town Hall/Academy complex.	This action has been completed.	Completed
7.4	Replace inadequate generators at Police, Highway and Parks Maintenance Facility.	This action has been completed.	Completed
7.5	Review feasibility of micro-grid system(s) within the Town Center area to supplement Town Facilities as well as specific business community operations such as gas stations and grocery stores. This system could be utilized in the event of an extended power outage.	Study was completed, and Town determined not to pursue a microgrid	Drop
Objective 8: Maintain strict control of development to and near flood prone areas.			
8.1	Continue to implement and enforce regulations.	This is an ongoing effort. This is a capability	Capability
Objective 9: Improve public safety's capabilities to reach isolated population.			
9.1	Consider drainage improvements to Shoddy Mill, Forest Lane and other areas of periodic flooding.	Drainage improvements assessed and determined not to be cost effective. Town will not pursue.	Drop
9.2	Consider purchasing additional watercraft for emergency rescue operations during flooding.	Town considered this action and determined not to pursue it.	Drop

Active Mitigation Strategies and Actions

The Town proposed to initiate several new mitigation actions for the upcoming five years. Additionally, a number of actions from the previous planning period are being carried forward or replaced with revised actions. These are listed below.

Each of the following actions has been prioritized based on FEMA guidelines, listed from highest to lowest priority, and numbered.

Action #1	
Complete the Tryon Street and Doug Road drainage project to reduce flooding in South Glastonbury.	
Goal	1. Minimize the impact of natural hazards on physical buildings and infrastructure
Category	Structural Projects
Lead	Public Works
Cost	More than \$100,000
Funding	Grants
Timeframe	07/2019 - 06/2021
Priority	High



Action #2

Conduct outreach to local small businesses with the aim of preventing the accidental release and pollution from chemicals stored and used at their facilities during or following natural hazard events.

Goal	6. Improve public outreach, education, and warning systems
Category	Education & Awareness
Lead	Planning, in coordination with DEEP
Cost	\$0 - \$10,000
Funding	Materials & Resources Provided by CT DEEP
Timeframe	01/2019 - 12/2019
Priority	Medium

Action #3

Coordinate with NEMO and CRCOG to share resources and gain technical support for hazard mitigation actions involving stormwater management and public outreach, which have parallel benefits related to MS4 stormwater permit compliance.

Goal	1. Minimize the impact of natural hazards on physical buildings and infrastructure
Category	Prevention
Lead	Engineering
Cost	\$0 - \$10,000
Funding	Town Operating Budget
Timeframe	01/2020 - 12/2020
Priority	Medium

Action #4

Participate in EMI courses or the seminars and annual conference held by the Connecticut Association of Flood Managers.

Goal	3. Improve institutional awareness and understanding of natural hazard impacts and mitigation within municipal governments and other decision-making bodies
Category	Education & Awareness
Lead	Planning
Cost	\$0 - \$10,000
Funding	Town Operating Budget
Timeframe	07/2019 - 06/2024
Priority	Medium



Action #5

Apply the same flood damage prevention guidelines to the Connecticut River floodplain and other isolated flood zones not associated with Roaring Brook, Salmon Brook, Grindle Brook, and Meadow Drain.

Goal	2. Ensure Municipal Codes and Regulations support hazard mitigation
Category	Prevention
Lead	Planning
Cost	\$0 - \$10,000
Funding	Town Operating Budget
Timeframe	07/2020 - 06/2021
Priority	Medium

Action #6

Work with MDC to identify potential hazard mitigation actions for MDC facilities, and list those actions in the next HMP Update.

Goal	5. Improve the resilience of local and regional utilities and infrastructure using strategies including adaptation, hardening, and creating redundancies.
Category	Property Protection
Lead	Public Works
Cost	\$10,000 - \$25,000
Funding	Town Operating Budget / DEMHS
Timeframe	07/2020 - 06/2022
Priority	Medium

Action #7

Conduct outreach to private property owners encouraging them to remove dangerous trees and branches on their property.

Goal	6. Improve public outreach, education, and warning systems
Category	Education & Awareness
Lead	Parks & Recreation
Cost	\$10,000 - \$25,000
Funding	Town Operating Budget
Timeframe	07/2020 - 06/2022
Priority	Medium



Action #8

Adopt best-practices guidelines for contractors performing major tree clearing projects to minimize impacts on drainage.

Goal	6. Improve public outreach, education, and warning systems
Category	Education & Awareness
Lead	Planning / Parks & Recreation
Cost	\$10,000 - \$25,000
Funding	Town Operating Budget
Timeframe	07/2020 - 06/2022
Priority	Medium

Action #9

Carry out a campaign to educate property owners on the impact of using water, especially private well water, to irrigate turf during droughts. Include alternative options.

Goal	6. Improve public outreach, education, and warning systems
Category	Education & Awareness
Lead	Health & Communications
Cost	\$10,000 - \$25,000
Funding	Town Operating Budget
Timeframe	01/2020 - 12/2022
Priority	Medium

Action #10

Update the Storm Drainage Management Reports prepared for the Roaring Brook, Salmon Brook, Grindle Brook and Meadow Drain watersheds to ensure their continued use as policy guidelines for development within these areas to prevent downstream flooding, erosion, and property damage.

Goal	2. Ensure Municipal Codes and Regulations support hazard mitigation
Category	Prevention
Lead	Planning
Cost	\$10,000 - \$25,000
Funding	Town Operating Budget
Timeframe	07/2020 - 06/2022
Priority	Medium



Action #11

Update the Town-wide storm drainage management program/Master Drainage Studies. Provide recommendations pertaining to the latest innovative techniques to manage stormwater quality and quantity, such as biofilters and rain gardens.

Goal	2. Ensure Municipal Codes and Regulations support hazard mitigation
Category	Prevention
Lead	Planning
Cost	\$10,000 - \$25,000
Funding	Town Operating Budget / Grants
Timeframe	07/2020 - 06/2022
Priority	Medium

Action #12

Identify long-term stream channel erosion problems and prioritize for remediation. Include specific remediation projects in the next HMP update.

Goal	1. Minimize the impact of natural hazards on physical buildings and infrastructure
Category	Structural Projects
Lead	Public Works
Cost	\$25,000 - \$50,000
Funding	Grants
Timeframe	07/2021 - 06/2023
Priority	Medium

Action #13

Make progress with the hazard mitigation goals associated with SustainableCT certified actions.

Goal	4. Increase the use of natural, "green," or "soft" hazard mitigation measures, such as open space preservation and green infrastructure.
Category	Natural Resources Protection
Lead	Planning
Cost	\$0 - \$10,000
Funding	Town Operating Budget
Timeframe	07/2021 - 06/2022
Priority	Low



Action #14

Promote the use of drywells and other infiltration structures to direct runoff and precipitation into structures for groundwater recharge

Goal	4. Increase the use of natural, "green," or "soft" hazard mitigation measures, such as open space preservation and green infrastructure.
Category	Property Protection
Lead	Planning
Cost	\$0 - \$10,000
Funding	Town Operating Budget
Timeframe	07/2021 - 06/2022
Priority	Low

Action #15

Adopt new Drought Ordinances that reflect and promote the findings and recommendations of the 2003 Connecticut Drought Preparedness and Response Plan (or future updates to that document).

Goal	2. Ensure Municipal Codes and Regulations support hazard mitigation
Category	Prevention
Lead	Planning
Cost	\$0 - \$10,000
Funding	Town Operating Budget
Timeframe	07/2021 - 06/2022
Priority	Low

Action #16

Coordinate with CT SHPO to conduct historic resource surveys, focusing on areas within natural hazard risk zones (such as flood or wildfire hazard zones and areas near steep slopes), to support identification of vulnerable historic properties and preparation of resiliency plans across the state. This action leverages existing resources and best practices for protection of historic and cultural resources through an ongoing statewide initiative by CT SHPO.

Goal	8. Ensure community character and social equity are addressed in mitigation activities
Category	Property Protection
Lead	Planning, in coordination with SHPO
Cost	\$10,000 - \$25,000
Funding	SHPO
Timeframe	07/2021 - 06/2023
Priority	Low



Capitol Region Natural Hazards Mitigation Plan Update

Glastonbury, Connecticut

Flood Plains, Dams & Critical Facilities

Critical Facilities

- [Emergency Center
- p Fire Station
- v Healthcare Facility
- { Police Station
- } Public Infrastructure
- o School
- ; State Facility
- 9 Town Facility
- Waste Water Facility
- NRHP Buildings/Sites
- NRHP Districts/Areas

Dam Hazard Class

- U A, AA, BB or Unclassified
- U Class B--Significant Hazard

FEMA Flood Hazard Area

- 100 Year Flood Zone
- 500 Year Flood Zone



Data Sources: FEMA, National Register of Historic Places, CT DEEP, CRCOG, ESRI