
TOWN OF GRISWOLD AND BOROUGH OF JEWETT CITY ANNEX DOCUMENT

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

March 2023



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1. INTRODUCTION	4
1.1. PURPOSE OF ANNEX.....	4
1.2. HAZARD MITIGATION AND CLIMATE ADAPTATION GOALS	5
2. COMMUNITY PROFILE	6
2.1. PHYSICAL SETTING	6
2.2. DRAINAGE BASINS AND HYDROLOGY	9
2.3. LAND COVER	9
2.4. POPULATION, DEMOGRAPHICS, AND DEVELOPMENT TRENDS.....	10
2.5. GOVERNMENTAL STRUCTURE.....	11
2.6. REVIEW OF EXISTING PLANS AND REGULATIONS	15
2.7. CRITICAL FACILITIES, SHELTERING CAPACITY, AND EVACUATION	17
2.8. REPETITIVE LOSS PROPERTIES.....	20
2.9. EXPOSURE TO CLIMATE-AFFECTED NATURAL HAZARDS	20
2.10. COMMUNITY CLIMATE CHANGE CHALLENGES	21
3. EXTREME AND SEVERE STORMS	22
3.1. CLIMATE CHANGE IMPACTS	22
3.2. HURRICANES AND TROPICAL STORMS	22
3.2.1 <i>Setting and Recent Occurrences</i>	22
3.2.2 <i>Existing Capabilities</i>	23
3.2.3 <i>Vulnerabilities and Risk Assessment</i>	25
3.2.3.1 Hazard Losses	26
3.3. TORNADOES AND HIGH WIND EVENTS	28
3.3.1 <i>Setting and Recent Occurrences</i>	28
3.3.2 <i>Existing Capabilities</i>	28
3.3.3 <i>Vulnerabilities and Risk Assessment</i>	29
3.3.3.1 Hazard Losses	29
3.4. SEVERE WINTER STORMS.....	30
3.4.1 <i>Setting and Recent Occurrences</i>	30
3.4.2 <i>Existing Capabilities</i>	31
3.4.3 <i>Vulnerabilities and Risk Assessment</i>	32
3.4.3.1 Hazard Losses	32
4. SEA LEVEL RISE	33
4.1. CLIMATE CHANGE IMPACTS	33
4.2. COASTAL FLOODING.....	33
4.2.1 <i>Setting and Recent Occurrences</i>	33
4.2.2 <i>Existing Capabilities</i>	33
4.2.3 <i>Vulnerabilities and Risk Assessment</i>	33
4.2.3.1 Hazard Losses	33
4.3. SHORELINE CHANGE.....	34
4.3.1 <i>Setting and Recent Occurrences</i>	34
4.3.2 <i>Existing Capabilities</i>	34
4.3.3 <i>Vulnerabilities and Risk Assessment</i>	34
4.3.3.1 Hazard Losses	34
5. CHANGING PRECIPITATION	35

5.1. CLIMATE CHANGE IMPACTS	35
5.2. RIVERINE AND PLUVIAL FLOODS	35
5.2.1 <i>Setting and Recent Occurrences</i>	35
5.2.2 <i>Existing Capabilities</i>	36
5.2.3 <i>Vulnerabilities and Risk Assessment</i>	38
5.2.3.1 Hazard Losses	44
5.3. DROUGHT	44
5.3.1 <i>Setting and Recent Occurrences</i>	44
5.3.2 <i>Existing Capabilities</i>	45
5.3.3 <i>Vulnerabilities and Risk Assessment</i>	45
5.3.3.1 Hazard Losses	45
5.4. DAM FAILURE	45
5.4.1 <i>Setting and Recent Occurrences</i>	45
5.4.2 <i>Existing Capabilities</i>	46
5.4.3 <i>Vulnerabilities and Risk Assessment</i>	48
5.4.3.1 Hazard Losses	52
6. RISING TEMPERATURES.....	53
6.1. CLIMATE CHANGE IMPACTS	53
6.2. EXTREME HEAT	53
6.2.1 <i>Setting and Recent Occurrences</i>	53
6.2.2 <i>Existing Capabilities</i>	54
6.2.3 <i>Vulnerabilities and Risk Assessment</i>	54
6.2.3.1 Hazard Losses	54
6.3. WILDFIRES	56
6.3.1 <i>Setting and Recent Occurrences</i>	56
6.3.2 <i>Existing Capabilities</i>	56
6.3.3 <i>Vulnerabilities and Risk Assessment</i>	56
6.3.3.1 Hazard Losses	57
7. EARTHQUAKES	58
7.1. CLIMATE CHANGE IMPACTS	58
7.2. EARTHQUAKES	58
7.2.1 <i>Setting and Recent Occurrences</i>	58
7.2.2 <i>Existing Capabilities</i>	58
7.2.3 <i>Vulnerabilities and Risk Assessment</i>	58
7.2.4 <i>Hazard Losses</i>	59
8. MITIGATION STRATEGIES AND ACTIONS	60
8.1. STATUS OF MITIGATION STRATEGIES AND ACTIONS	60
8.2. PRIORITIZATION OF SPECIFIC ACTIONS	62

LIST OF FIGURES

FIGURE 2-1 LOCATION OF THE TOWN OF GRISWOLD AND BOROUGH OF JEWETT CITY IN THE SCCOG REGION8
FIGURE 3-1 HURRICANE ISAIAS FUNDING CATEGORIES.....26
FIGURE 4-1 FOUR LOCALIZED SEA LEVEL RISE SCENARIOS FOR CONNECTICUT.....33
FIGURE 5-1 CCVI FLOOD VULNERABILITY FOR THE TOWN OF GRISWOLD AND JEWETT CITY39
FIGURE 5-2 TOWN OF GRISWOLD FEMA SPECIAL FLOOD HAZARD AREAS.....43
FIGURE 5-3 DAMS REGISTERED WITH DEEP IN GRISWOLD47
FIGURE 6-1 CCVI HEAT VULNERABILITY FOR THE TOWN OF GRISWOLD AND JEWETT CITY55

LIST OF TABLES

TABLE 2-1 TOWN OF GRISWOLD LAND COVER9
TABLE 2-2 TOWN OF GRISWOLD CRITICAL FACILITIES17
TABLE 2-3 TOWN OF GRISWOLD EXPOSURE ANALYSIS20
TABLE 2-4 JEWETT CITY EXPOSURE ANALYSIS.....20
TABLE 3-1 HAZUS-MH HURRICANE RELATED ECONOMIC IMPACTS26
TABLE 3-2 HAZUS-MH HURRICANE RELATED BUILDING DAMAGE.....27
TABLE 3-3 HAZUS-MH HURRICANE RELATED DEBRIS AND SHELTERING NEEDS.....27
TABLE 5-1 HAZUS-MH RIVERINE FLOOD RELATED ECONOMIC IMPACTS.....44
TABLE 5-2 DAMS REGISTERED WITH DEEP IN THE TOWN OF GRISWOLD.....48
TABLE 6-1 DAILY MAXIMUM TEMPERATURES FROM MAY TO SEPTEMBER SINCE 2017.....53
TABLE 7-1 HAZUS-MH EARTHQUAKE RELATED ECONOMIC IMPACTS.....59
TABLE 8-1 TOWN OF GRISWOLD ACTIONS AND STAPLEE AND PERSISTS SCORES.....63
TABLE 8-2 BOROUGH OF JEWETT CITY ACTIONS AND STAPLEE AND PERSISTS SCORES64

1. Introduction

1.1. Purpose of Annex

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

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

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

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

The purpose of this HMP annex is to provide an update to the hazard risk assessment and capability assessment provided in the previous HMP, and to evaluate potential hazard mitigation measures and prioritize hazard mitigation projects specific to mitigating the effects of hazards on the Town of Griswold and the Borough of Jewett City. Background information and the regional effects of pertinent hazards are discussed in the main body of the Multi-Jurisdictional Hazard Mitigation and Climate Adaptation

Plan. Thus, this annex is designed to supplement the information presented in the Multi-Jurisdictional HMCAP with more specific detail for Griswold and the Borough 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

The Town of Griswold is a rural community which is located approximate 4.5 miles to the northeast of the City of Norwich and approximately 18 miles -northeast of the City of New London. Griswold lies in the northeast portion of New London County and borders Windham County to the north. The town includes one borough, Jewett City, which is situated along Ashland Pond (the Quinebaug River) in the western portion of town along the boundary with the Town of Lisbon.

By 1715, what would become the Town of Preston was divided into two sections: the South Society and the North Society. The North Society was later transformed into the Town of Griswold. The establishment of Griswold as a town took place in 1815 when the North Society petitioned to the State General Assembly to incorporate the area as a town.

Griswold is approximately 37 square miles in area and had a population of 11,402 as of the 2020 census. The town is bordered mostly by the Town of Plainfield and partially by the Town of Canterbury (both towns within Windham County) to the north, the Town of Voluntown to the east, the towns of North Stonington and Preston to the south, and the Town of Lisbon to the west. The lone interstate in Griswold, which traverses the northwestern corner of town, is Interstate 395. Other significant routes which traverse different areas in town include: Route 12 (Plainfield Road), Route 201 (Hopeville and Glasgo Road), Route 138 (Voluntown Road), Route 164 (Preston Road), and Route 165 (Shetucket Turnpike)

2.1. Physical Setting

The Town of Griswold is a rural community that is 36.9 square miles in area and is located in northeast New London County, bordering Windham County to the north. Griswold is characterized by its many rivers, lakes, and farms. Several large rivers flow through town including the Pachaug River and Quinebaug River. The Borough of Jewett City is located at the junction of the Pachaug and Quinebaug Rivers. The borough contains the most densely developed land in Griswold.

Griswold contains two State Forests, the Pachaug State Forest, and Hopeville State Forest. Within its boundaries, the Hopeville State Forest contains a campground, a beach, a boat launch, and many hiking trails. Many people travel to Griswold to hike the trails during the summer and fall months. One of the largest bodies of water in Griswold is Pachaug Pond, which is also the site of a State of Connecticut boat launch, a marina, and a campground. Pachaug Pond is an impoundment on the Pachaug River and is largely fed by the Pachaug River, Burton Brook, and Billings Brook.

Geology is important to the occurrence and relative effects of natural hazards such as earthquakes. Thus, it is important to understand the geologic setting and variation of bedrock and surficial formations in lands underlying Griswold.

In terms of North American bedrock geology, Griswold is located in the northeastern part of the Appalachian Orogenic Belt, also known as the Appalachian Highlands, which extend from Maine southward to Mississippi and Alabama. The Appalachian Highlands were formed when Pangaea assembled during the late Paleozoic era. The region is generally characterized by deformed sedimentary rocks cut through by numerous thrust faults. The western half of Griswold is located within the Merrimack Synclinorium of the Iapetus Geologic Terrane, while the eastern half is located in the

Avalonian Anticlinorium of the Avalonian Geologic Terrane. There are numerous faults in Griswold, with the predominant Lake Char thrust fault at the boundary between the two terranes. This fault bisects the town and is oriented in a north-south direction. Two additional faults are located in the western section of the town, oriented in a southwest northeast direction. An additional high angle fault parallels the Lake Char thrust fault just to the east of the major fault.

The town lies above eleven bedrock types. The largest formation is the Quinebaug Formation, which covers nearly the entire western half of town. The Preston Gabbro Formation (Dioritic phase) has a few small areas that lie within the boundaries of the eastern half of town. These formations are generally aligned in a northeast-southwest manner along the general alignment of a fault that traverses through the western half of town.

Griswold contains various bedrock types, with the greatest variation occurring east of the Lake Char fault. The primary formation to the west of the fault is the Quinebaug Formation, characterized by gray to dark-gray, medium-grained, well-layered gneiss. To the east of the Lake Char Fault, near vertical bands include Mylonite along Paleozoic faults, Waterford Group, Hope Valley Alaskite Gneiss, Porphyritic phase of Potter Hill Granite Gneiss, "Scituate" Granite Gneiss and Plainfield Formation.

The eastern half of town is characterized by four faults. The faults branch with three branching off in a northwest-southeast orientation and one which is orientated in a northeast-southwest direction. The formations follow the faults in their orientations. The three most prominent bedrock formations in Griswold are briefly discussed below.

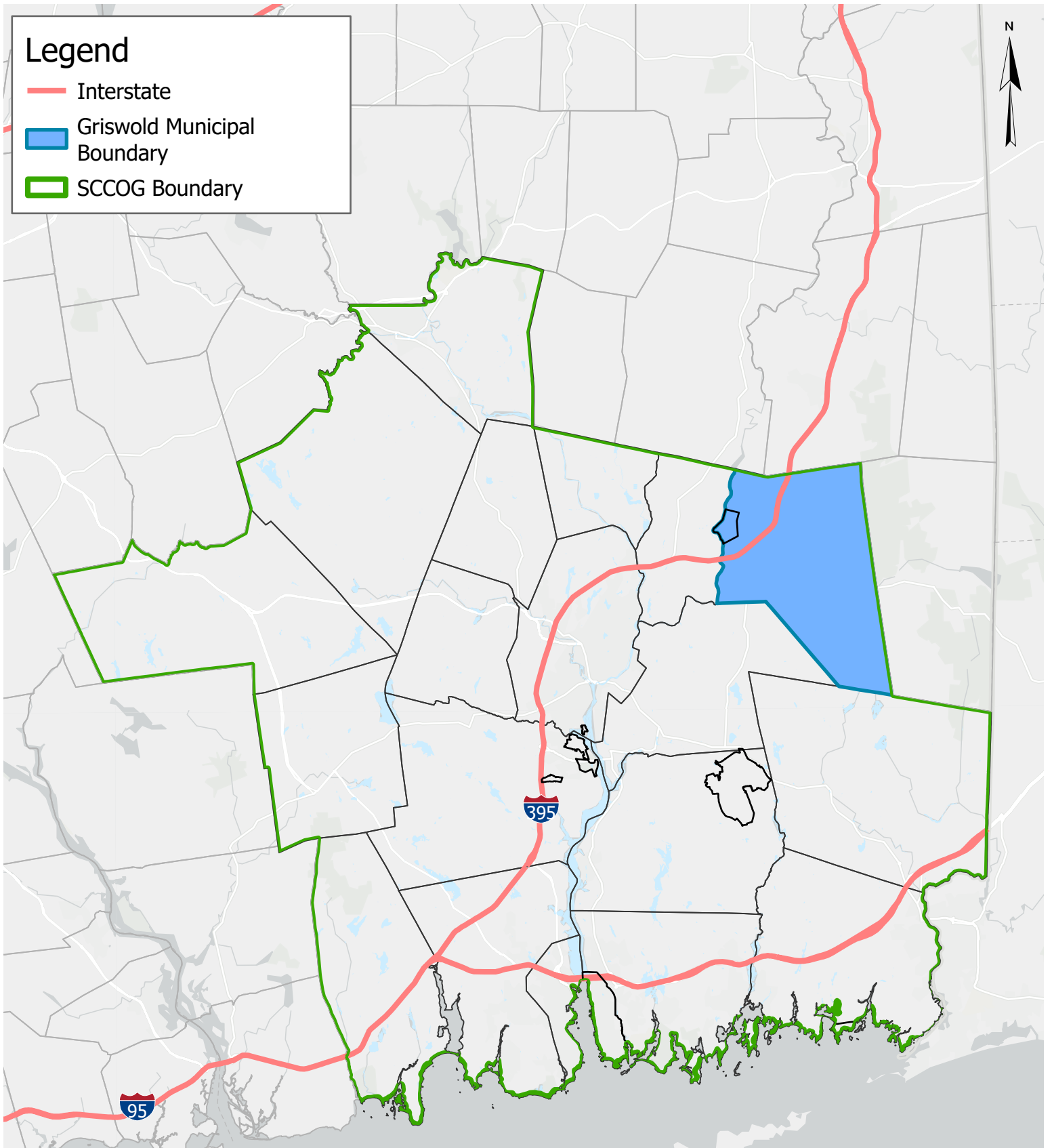
- The Quinebaug Formation is a grey to dark-grey, medium grained, well-layered gneiss. This formation accounts for almost the entire western half of Griswold.
- The Hope Valley Alaskite Gneiss Formation consists of light pink to grey medium to coarse grained granitic gneiss. This formation comprises approximately 15% of town.
- The Preston Gabbro Formation is comprised of a dark, medium to coarse-grained massive gabbro. Approximately 15% of town is covered by this formation.

The town's different surficial geologic formations include glacial till and stratified drift. Refer to the Multi-Jurisdictional HMP for a generalized view of surficial materials. The majority of the town is underlain by glacial till. The exceptions are Billings Brook, the Pachaug River, the Quinebaug River, and the many tributaries and ponds in town including Crooked Brook, Hawkins Brook, Norman Brook, Mill Brook, Hopeville Pond, Pachaug Pond, Clayville Pond, Ashland Pond, and other named and unnamed tributaries and water bodies throughout Griswold. These areas of stratified drift include sand, swamp, gravel, fines, and alluvium.

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 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. However, the smaller glacial till watercourses can also cause flooding. The amount of stratified drift also has bearing on the relative intensity of earthquakes and the likelihood of soil subsidence in areas of fill.

Legend

- Interstate
- Griswold Municipal Boundary
- SCCOG Boundary



Regional Location of Griswold

SCCOG Hazard Mitigation and Climate Adaptation Plan

Town of Griswold

Date: 7/22/2022



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

2.2. Drainage Basins and Hydrology

Griswold drains to two regional basins, the Pachaug River and the Quinebaug River. The town is divided among seven sub-regional basins: Billings Brook, Broad Brook, Mill Brook, Mount Misery Brook, Myron Kinney Brook, the Pachaug River, and the Quinebaug River. The majority of town (approximately 58%) drains directly to the Pachaug River sub-regional and regional watershed. Waterways in the northwest corner and along the western boundary flow towards the Quinebaug River: a tributary of the Thames River. Streams along the southwest perimeter flow towards Broad Brook: a tributary of the Quinebaug River. The northeast corner of town drains to Mill Brook: a tributary of the Quinebaug River. Waterways in the southeast corner flow towards Billings Brook, a tributary of the Pachaug River. A small portion of town along the southeast corner of town drains to Myron Kinney Brook, while a small portion of area along the northeast border of town drains to Mount Misery Brook. Both brooks are tributaries of the Pachaug River. All drainage basins eventually drain to the Thames River via the Quinebaug River and the Shetucket River.

There are a number of large water bodies within Griswold. The largest, Pachaug Pond, is located in the southeast section of town. Pachaug Pond lies generally in a north-south orientation between Routes 138 and 165 and covers approximately 817 acres of land. The pond is an impoundment formed by the Pachaug Pond Dam (Class C) at its northwest corner on the Pachaug River. Upstream impoundments on the Pachaug River include the Glasgo Pond Dam (Class C), the Town Line Pond Dam (Class A), and the Sawmill Pond Dam (Class C).

Hopeville Pond (approximately 107 acres) and Ashland Pond (approximately 89 acres) are both located on the Pachaug River downstream of Pachaug Pond in the east-central portion of Griswold. They are each impoundments created by dams of the same name. Clayville Pond is located on a tributary to the Quinebaug River in the northwest section of the town and formed as a result of the construction of the Clayville Road Dam (Class A per the CT DEEP 1996 dam inventory).

Aspinook Pond is located in the northwest corner of Griswold, bisected by the municipal boundary between Griswold and the adjacent town of Lisbon. Aspinook Pond is a reservoir impounded by the Aspinook Pond Dam located on the Quinebaug River in Griswold.

2.3. Land Cover

According to the 2016 1-meter resolution land cover developed by the NOAA Office of Coastal Management, Griswold is predominantly comprised of mixed forest, with approximately 61.37% of the town classified as such. The second largest land cover type is palustrine forested wetland, which covers about 7.84%, and next is developed open space which is about 6.09% of land cover. Only about 4.96% of Griswold is considered developed impervious according to this dataset. All land covers and their percent coverage can be found in Table 2-1.

Table 2-1 Town of Griswold Land Cover

Land Cover Type (2016)	% Coverage
Barren Land	0.61
Cultivated Crops	1.83
Developed, Impervious	4.96

Developed, Open Space	7.42
Grassland/Herbaceous	3.05
Mixed Forest	61.37
Open Water	5.45
Palustrine Aquatic Bed	0.66
Palustrine Emergent Wetland	0.77
Palustrine Forested Wetland	7.84
Palustrine Scrub/Shrub Wetland	0.32
Pasture Hay	4.43
Scrub/Shrub	0.83
Unconsolidated Shore	0.45

2.4. Population, Demographics, and Development Trends

As of the 2020 Decennial Census, the population for the town is 11,402, which equates to about 309 people per square mile. The majority of the developed portion of Griswold is the Borough of Jewett City where a mix of residential, commercial, industrial, farmland, and open space is located. The second most developed areas of Griswold are Glasgow, Doanville, Pachaug, and around Hopeville Pond. In this area, land uses include industrial, commercial and some high density residential. There are also some subdivisions and mobile home parks scattered throughout town that could be considered “suburban areas”. The remaining commercial and industrial lands are associated with the major roadways in town. The remaining land uses in town are largely defined by the POCD as being "rural". These rural areas, according to the 2017 POCD, are the least densely developed areas comprised of scattered and isolated single-family homes, and agricultural uses.

Griswold has been working for over a decade to increase and expedite economic development by designating a Business Park zone in town and creating incentive programs for new businesses. It was found that the residential uses in town have a negative net tax contribution in town, therefore increasing commercial and industrial tax base is critical for Griswold. Active Residential development projects include:

- A new condominium complex is being constructed on Pleasant View Street.
- The Oak Tree Apartment Complex on 97 Preston Road has been constructed and include 74 approved units. There is a possibility more units will be added in the future.

Recent and active commercial development projects include:

- A commercial subdivision on Route 138 has been completed.
- A hotel project near I-395 has been completed.
- An Exxon Petro Max gas station has been built on Route 164.
- A hotel construction project on Route 164 is in its planning stage.
- United Community and Family Services is planning on constructing facility at 201 Mary Street.
- An Auto Repair Shop is proposed off route 138.

- The old mill on Anthony Street next to the Aspinook/Quinebaug river and the train tracks is being rehabilitated and converted into a major wind-turbine manufacturing center. The owner expects to be operational in 2017.
- A large, 7 megawatt-per-day solar farm is planned for an open-space area at the intersection of Route 138 and 201.

Although certain development opportunities exist throughout Griswold, the focus in most of the town is on either maintaining or improving the existing patterns of development. At the same time, Griswold desires economic growth, and the identification of areas capable of supporting economic development is a priority of Griswold. Many of the areas that are ideal for economic growth have some constraint to development (e.g., riverine flooding, steep slopes), so it is important to identify methods of overcoming those constraints if possible.

Preservation of open space is also important in Griswold. The Avalonia Land Conservancy acquired a large tract of forested land at the Griswold-Preston-North Stonington lines in 2018. This "Tri-Town Forest" will include 74 acres of land in Griswold, 302 acres in North Stonington, and 33 acres in Preston (409 acres of land overall). In the same year, Avalonia also acquired The Aurelie and Stanley Boyd Tract which is a 54 acre tract on Rixtown Town in Griswold.

The existing water supply system is provided by the Jewett City Water Company. The water and sewer systems of Griswold are capable of supporting all anticipated growth with service extensions. Although some expansion of other public facilities will be necessary to accommodate the future population of Griswold, the town's public facilities and utilities are not constraints to growth.

The 2020 American Community Survey 5-year estimates identified the annual average median income for Griswold to be \$63,394, with an average of 16.6% of the population holding a bachelor's degree or higher, and an average unemployment rate of 3.4% throughout town.

2.5. Governmental Structure

The Borough of Jewett City is a government within the government of the Town of Griswold. Those who live in the one square mile borough are taxed twice (for Jewett City and for Griswold). The borough government is made up of a warden and 4 burgesses who set policy and enforce the law of charter. The government also consists of a treasurer, assessor, clerk, tax collector, and bailiff. The Borough also owns the electric light plant and sewer plant (Jewett City Department of Public Utilities). Other municipal services are provided by the Town of Griswold.

Griswold 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 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. The various town departments, boards and commissions which may play a role in the implementation of this plan include:

- Building Department – Building Official and Zoning/Wetland Enforcement Officer
- Planning & Community Development Office – Town Planner
- Public Works Department – Director of Public Works
- Fire Marshal Office – Emergency Management Director & Fire Marshal, Fire Chief & Road Superintendent
- Inland Wetlands and Watercourses Conservation Commission and Aquifer Protection Agency and the Planning & Zoning Commission
- Public Health and Safety Committee
- Open Space Land Acquisition Committee
- Economic Development Commission
- Space Needs Committee

The following subsections describe general departmental responsibilities, and duties related to natural hazard mitigation. Where applicable, one or more of the six types of mitigation (prevention, property protection, natural resource protection, structural projects, emergency services, and public education) are identified as relevant for each department.

Building Department – Building Official and Zoning/Wetland Enforcement Officer

The Building Official administers the Griswold's building inspection program adhering to and enforcing all code requirements of the State of Connecticut relating to building construction. Additional responsibilities include administering and enforcing all related state codes for the safety, health, and welfare of persons and properties in town, supervising departmental policies and procedures, and providing technical assistance to Griswold officials.

It is the Building Department's responsibility to review all proposed structures. Inspections and enforcement take place according to the Connecticut State Building Codes relative to the manner of construction and materials to be used for the occupancy and maintenance of all buildings and structures within Griswold. It is also the Building Department's responsibility to grant or deny approval of all building materials, dimensions, structural integrity, and zoning compliance. The Building Department must make available all building records, which are public information, during Town Hall business hours.

The Building Official has a unique responsibility when it comes to hazard mitigation as he is responsible for overseeing a number of codes such as those related to wind damage prevention as well as those related to flood damage prevention. Although other departments and commissions may review development plans and develop or revise regulations, many important types of pre-disaster mitigation are funneled through and enforced by the Building Department. For example, the Building Department enforces A-zone standards for floodproof construction and building elevations, maintains elevation certificates, and enforces building codes that protect against wind and fire damage. Thus, the types of mitigation that are administered by the Building Department include prevention and property protection.

Additionally, the Building Official serves as the town's Zoning Enforcement Officer and Wetlands Enforcement Officer. As such, the Building Department investigates complaints received and issues, if necessary, orders with re-inspection to ensure compliance. The Enforcement Officer has the authority to

turn non-compliant issues to Griswold's attorneys for legal action. The Enforcement Officer also has the ability to order immediate cease and desist of actions in any form in the interest of code compliance or public safety and general welfare.

The primary role of the Building Department during disaster situations is to provide damage assessment, inspect damaged buildings and issue permits for temporary structures and actions necessary to maintain safety standards.

Griswold Public Safety

The Griswold Public Safety group consists of Troop E (Montville) of the Connecticut State Police, the Public Utilities Emergency Department, the Griswold Volunteer Fire Department, and the Griswold Community Ambulance fleet.

The Town of Griswold Volunteer Fire Department consists of two fire companies, under the direction of a town-wide Chief. Mutual aid and automatic aid are provided to the towns that surround Griswold through county and state mutual aid agreements. The two fire companies in Griswold are the A. A. Young Jr, Hose and Ladder Company No. 1 (Jewett City Fire Department, Station 56), which is located in the Borough of Jewett City, and the Griswold Volunteer Fire Department, Station 55 which is located in the east-central portion of town near the border with the Town of Voluntown. The A.A. Young Jr. Hose and Ladder Company No. 1 is located at 105 Hill Street in the Borough of Jewett City section of Griswold. Station 55 is located at the intersection of Route 138 and Old Bethel Road (883 Voluntown Road). The Fire Departments are the primary agency involved with hazard mitigation through emergency services and public education.

Company No. 1 has a primary response area of District 1 which includes Route 12 to the Canterbury/Plainfield town line, Route 12 south to the Lisbon town line, west of I-395 and the Borough of Jewett City. Station 55 has a primary responsibility to serve District 2 which covers all of Griswold east of Station 55 to the Voluntown town line which includes I-395 North and south from the Lisbon town line to I-395 Exit 87 in Plainfield.

Ambulance services are provided by American Ambulance, which is a private company. They are currently operating remotely until constructing a more permanent location in town.

The Griswold Visiting Nurses Agency (VNA) is located in the former Ashland Mill Building. They are associated with Day Kimball Hospital in Putnam.

The Borough of Jewett City has two resident state troopers, but the remainder of Griswold relies on Connecticut State Police Troop E in the Town of Montville. The types of mitigation that are directly administered by the Police include mainly emergency services and public education. Communication and coordination between the Connecticut State Police and the two Fire Departments is critical before, during, and after natural hazard emergencies.

Public Works Department

The town has a Public Works Department whose responsibilities include construction and maintenance of roadways, sidewalks, and drainage systems; maintenance of all parks and school properties; street

sweeping, sanding, and snow removal; the preservation, care, and removal of trees within the town's rights-of-way and/or public places, and maintenance of town vehicles and equipment, and the bulky waste facility. Griswold has one public works garage, located on Route 138, where the town stores sand and salt among other equipment. The Public Works Department also assists the Town Parks Committees with maintenance of the town parks and assists with the upkeep of the athletic fields. Public Works has also provided assistance with the renovations of town hall in the past. With the large area of water bodies in town, Public Works assists the CT DEEP in the protection of the large beaver population and the assistance with flooding control.

As is common throughout Connecticut, Public Works Departments are often charged with implementing numerous structural projects that are related to hazard mitigation. Specifically, roadway/infrastructure maintenance and complaint logging/tracking are the two primary duties of the Public Works Department. For example, the Public Works Department tracks, plans, prepares for, and responds to flooding, inundation, and/or erosion of roads and infrastructure such as sewer pumping stations and the wastewater treatment plants (the Jewett City & the Glasco Water Pollution Control Facilities). The Public Works Department also conducts snow removal and deicing on roads, trees and tree limb removal in rights-of-ways and maintains and upgrades storm drainage systems to prevent flooding caused by rainfall.

As a result of the duties described above, the Public Works Department is often the de facto first responder during emergencies. The Public Works Department must maintain access for the State Police and Griswold Fire Department to respond to emergencies.

Space Needs Committee

The Commission of thirteen is charged with identifying residents' needs within the community in the town. Identifying sites and planning accordingly alongside other town officials is instrumental in preparation for potential natural disasters and emergency response in the future.

Inland Wetlands and Watercourses Conservation Commission and Aquifer Protection Agency

Comprised of seven members and three alternates, the IWWCC & APA carries forth the regulations set in the Inland Wetland & Watercourses Conservation Commission Regulations (August 2006).

Economic Development Commission

The Commission of five is charged to pursue opportunities to attract and expand the businesses stock in town. Additionally, the Commission seeks to maintain existing business to the greatest extent possible. Identifying sites and planning accordingly alongside other town officials is instrumental in preparation for potential natural disasters and emergency response in the future.

Open Space Land Acquisition Committee

The Committee of seven is charged to review potential acquisitions of land or interests in land for open space, natural resource protection, recreational or agricultural purposes in order to make

recommendations to the Board of Selection regarding acquisition of land, use of the Open Space Land Acquisition Fund, and perform other tasks.

Fire Marshal Office – Emergency Management Director & Fire Marshal, Fire Chief & Road Superintendent

The Fire Marshal's Office conducts reviews on three family or greater homes and commercial buildings. Among other things, the Office also conducts emergency disaster planning, represents emergency services on various projects.

Planning and Community Development Office

The Planning and Community Development Office serves as the technical staff supporting the Griswold Board of Selectmen, the Planning and Zoning Commission, the Zoning Board of Appeals, the Inland Wetlands and Watercourses Conservation Commission, and the Economic Development Commission. In practice, the Town Planner enforces the local Zoning and Subdivision Regulations, provides staff assistance to the Planning and Zoning Commission, and performs long term planning activities related to land use and community development. The department is charged with the duty of drafting, updating, and implementing the goals and objectives of the Griswold Plan of Conservation and Development which is currently being updated. The Planning and Community Development Office provides assistance to the Building Department and is responsible for housing and economic development planning.

Because the Planning and Community Development Office assists the applicable commissions with administration of the Zoning Regulations, Subdivision Regulations, and Inland Wetland Regulations, the department is responsible for elements of almost all six facets of mitigation (prevention, property protection, natural resource protection, structural projects, emergency services, and public education).

Additional Groups

In addition to town offices, municipal titles, and commissions/committees, the American Red Cross and the Salvation Army provide services related to mitigation and emergency management. The American Red Cross and the Salvation Army help provide shelter and vital services during disasters and participates in public education activities.

2.6. Review of Existing Plans and Regulations

Griswold has two primary plans which act to address elements of hazard mitigation and disaster preparedness.

Plan of Conservation and Development

The Plan of Conservation and Development (POCD) was made effective on February 8, 2018, with contributions from local boards and commissions, citizens, and citizen groups. The purpose of the POCD, which includes Jewett City, is to meet the need of the community locally and regionally, preserve the character of the town, and to enhance the quality of life.

The POCD includes the following actions that the Town has completed or was pursuing at the time:

- Encourage and support interconnectivity throughout town.

- Recommend revisions to the Griswold Road Ordinance for alternative stormwater management systems or Best Management Practices (BMPs)
- Continue to implement Low-Impact Development (LID) programs.
- Support open space acquisitions.

The POCD does not directly address hazard mitigation or natural hazards; however, it does provide strategies for addressing development in floodplains, near wetlands, and regulatory changes to limit flooding.

The Griswold POCD is considered inconsistent with the current goals and actions of the hazard mitigation plan. It does not directly address several of the hazards such as winter storm hazards, flood awareness, earthquake hazards, and wind hazards. The next update to the POCD (scheduled for 2027, during the life of the current hazard mitigation plan) should incorporate more elements of the hazard mitigation plan.

Emergency Operations Plan

Griswold 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 has an annex applicable to severe weather and natural hazards. The EOP is reviewed and updated annually.

Zoning and Subdivision Regulations

Hazard prevention includes identification of risks and the use of land-use regulatory and other available management tools to prevent future damage. Griswold has planning and zoning tools in place that incorporate floodplain management. The town's planning and zoning regulations, inland wetlands and watercourses regulations, and the building department's enforcement of the Connecticut Basic Building Code are all important existing regulatory mechanisms that address hazard prevention and incorporate floodplain management.

The Town of Griswold and the Borough of Jewett City have separate Zoning regulations. The Town of Griswold's Zoning Regulations have been revised to December 1, 2018. The Borough of Jewett City's Zoning Regulations have been revised to August 10, 2017.

The town and the Borough use the same Subdivision Regulations, which have been revised to June 1, 2015. The Borough has a flood ordinance, while flooding regulations in the remainder of Griswold are in Section 11.4 of the Zoning Regulations. A comprehensive set of Flood Regulations for all of Griswold were published in July 2011 and refer to the FEMA Flood Insurance Study (FIS) and Flood Insurance Rate Map (FIRM) dated July 18, 2011. These regulations are Griswold's articulation of the NFIP regulations.

Stormwater requirements are noted in Section 4.4 of the Subdivision Regulations, where low impact development techniques are encouraged, and the state's Stormwater Quality Manual is identified as the design guideline.

2.7. Critical Facilities, Sheltering Capacity, and Evacuation

The Town of Griswold and Borough of Jewett City consider 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. The two Fire Departments, Town Hall, Public Works Garage, Senior Center, its four schools, and Wastewater Treatment Plant (WWTP) are considered to be Griswold's critical municipal facilities. Table 2-2 lists the critical facilities in Griswold. A few notable categories of critical facilities are discussed below.

Table 2-2 Town of Griswold Critical Facilities

Facility	Address or Location	Emergency Power	Shelter	Cooling Center	In SFHA
Emergency Services					
Griswold Volunteer Fire Co.	883 Voluntown Road	✓	✓		
A.A. Young Jr. Hose & Ladder Co. #1	105 Hill Street, Jewett City	✓	✓		
Griswold Youth and Family Services	68 Ashland Street, Jewett City				✓
Municipal Facilities					
Town Hall	28 Main Street				
Public Works Garage	1148 Voluntown Road (Rt 138)				
Senior Center	22 Soule Street		✓	✓	
Griswold Elementary School	303 Slater Avenue, Jewett City	✓	✓		
Griswold Middle School	211 Slater Avenue				
Griswold High School	267 Slater Avenue				
Slater Library	26 Main Street, Jewett City			✓	
Health Care/Senior Living					
Ashland Manor (Housing Authority)	Ashland Street				
McCluggage Manor (Housing Authority)	Taylor Hill Road				
Ledgewood Apartments	Pleasant View Drive				
United Community & Family Services	76 Main Street				
Other Infrastructure/Facilities					
Wastewater Treatment Plant	Wedgewood Drive				✓
Little Log School House (Daycare)	242 Bitgood Road, Jewett City				
Headstart (Daycare)	129 E. Main Street, Jewett City				
Water Treatment Facilities	Hopeville Road and Reservoir Road				

Town Hall

The Town Hall is located within a complex that serves to centralize several public services and facilities in one area. This complex consists of the Town Hall, Slater Library, and the Griswold Senior Center.

Fire Department Facilities

The Griswold Volunteer Fire Department is located at the intersection of Route 138 and Old Bethel Road. This building is also the Town's Emergency Operations Center. The plans for the building show that it should be at least one foot out of the floodplain, but the previous FIRM suggested that it was in the floodplain. The current DFIRM shows that it is not in a Special Flood Hazard Area (SFHA) floodplain. The SFHAs are land areas covered by 1 percent annual chance flood events, which are FEMA-designated Zones AE (1 percent annual chance flood zone with elevations) and Zone A (1 percent annual chance flood zone without elevations). The Fire Department did not flood during the heavy rain events in March of 2010.

The A.A. Young Jr. Hose and Ladder Company No. 1 is located on Hill Street in Jewett City and is not situated in the floodplain. The A.A Young Firehouse was recently renovated and now has a co-ed/ADA bathroom, shower, new flooring, and a generator and air conditioning. The Town contracts its Ambulance services to American Ambulance; these vehicles are housed at the A.A. Young Jr. Hose and Ladder Company No. 1 building. American Ambulance's offices are located on the second floor of the Griswold Youth & Family Services building. They are considering construction of a new site, or the reuse of the old Community Ambulance Building, to have a dedicated ambulance service site.

The POCD notes that the Department of Fire and Rescue recommend construction of two new substations in the areas of Griswold not adequately served by the existing stations.

Shelters

Emergency shelters are considered to be an important subset of critical facilities as they are needed in emergency situations. These are not to be confused with safe rooms or individual storm shelters, such as designated rooms in certain buildings that are meant to provide increased levels of protection from winds. A primary shelter should have the ability to operate with a standby source of power such as an emergency generator. While FEMA's mitigation programs are not able to fund generators, other funding programs are available for purchase of generators. The most notable example is the "Emergency Operations Center and Emergency Shelter Generator Grant Program" administered by Connecticut Department of Emergency Management and Homeland Security (DEMHS). This program specifically targets emergency operations centers and shelters, and awards can only be made for municipal facilities.

The Griswold Volunteer Fire Department is the primary shelter. It has a generator that was purchased in July of 2011. The facility can hold approximately 50 people and is American Red Cross (ARC) certified. The A.A. Young Jr. Hose and Ladder Company No. 1 is the backup shelter with a generator. The facility can hold 75 people but has not gone through the ARC certification process. The tertiary shelter is the Griswold Elementary School. It is currently undergoing construction, but it can hold about 400 people in the gymnasium. It has a generator but has also yet to pass through the ARC certification process. While the Elementary School can hold approximately 400 people, Griswold lacks ample bedding for the location.

The Senior Center is an emergency shelter but does not have a generator. However, the Senior Center will likely be relocated after the adoption of this plan to 220 Taylor Hill Road; this new facility will

include a generator. During Tropical Storm Irene, the Senior Center (22 Soule Street) was used primarily for logistics (sorting food deliveries to seniors, etc.). The old Senior Center will ultimately become an alternative school and will also be available as a cooling center if need be. The ARC plans to evaluate the Senior Center to determine shelter requirements in the near future.

The Senior Center and Slater Library have also been identified as cooling centers for resident use during a heat wave or extreme heat event.

Communications

Griswold relies on radios, email, telephone, and cellular phone service to communicate. The town recently received a public works grant through the State of Connecticut to upgrade its radio systems. All fire trucks have both low band and high band radio capabilities, and the town can communicate with the State of Connecticut.

Emergency personnel had difficulty communicating with important town staff during the long Tropical Storm Irene power outage because cellular phone towers were without power, and many trees had damaged telephone lines. In response, Griswold now has additional radios for the building inspector and sanitarian. Since 2017 additional towers have also been constructed including one near the Voluntown and Griswold Border which has helped to improve communications.

There are a number of public communication capabilities that exist within the Town but are not operated by the Town government, and do not reach the Town's entire population. These include:

- The Public School has a system for contacting parents of students.
- Baptist Church in Jewett City has a PA system in its belltower that can be used to send out warnings to the limited area within earshot.
- Wolverine Radio began operating on Main Street two years ago. Emergency communications are frequently broadcast through that service.

The Town is interested in developing agreements and arrangements to utilize these public communication methods in case of public emergency.

Evacuation Routes

Griswold does not have a published evacuation map, but rather utilizes state roads or local roads to exit the town. The SCSOG Long Range Regional Transportation Plan (LRRTP) (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. Griswold uses the LRRTP for guidance when evacuation is needed. The LRRTP also has a bypass plan with the CT DOT for re-routing traffic on I-395 during emergencies. An example of this use was an overturned propane truck which happened within the past few years. Higher capacity egress routes from Griswold include Interstate 395, Route 138, Route 201, Route 164, Route 165, and Route 12. The LRRTP does recommend increasing the capacity of Interstate 395.

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 Griswold 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 2-3 for Griswold and Table 2-4 the Borough of Jewett City.

Table 2-3 Town of Griswold Exposure Analysis

Hazard	At-Risk Parcels		At-Risk Facilities		At-Risk Historic Assets	
	Value	Number	Value	Number	Value	Number
Hurricane/Tropical Storm	\$635,875,730	3,892	\$21,607,390	5	\$1,258,950	6
Severe Thunderstorm	\$635,875,730	3,892	\$21,607,390	5	\$1,258,950	6
Severe Winter Storm	\$635,875,730	3,892	\$21,607,390	5	\$1,258,950	6
Tornado	\$635,875,730	3,892	\$21,607,390	5	\$1,258,950	6
Drought	\$502,603,560	2,998	\$10,039,260	4	\$1,014,020	4
Flood						
1% Annual Chance	\$141,074,840	619	\$20,228,110	3	\$562,800	3
0.2% Annual Chance	\$152,058,250	693	\$20,228,110	3	\$562,800	3
Earthquakes	\$635,875,730	3,892	\$21,607,390	5	\$1,258,950	6
Wildfire	\$423,045,170	2,300	\$10,039,260	4	\$1,014,020	4

Table 2-4 Jewett City Exposure Analysis

Hazard	At-Risk Parcels		At-Risk Facilities		At-Risk Historic Assets	
	Value	Number	Value	Number	Value	Number

Hurricane/Tropical Storm	\$127,219,040	779	\$2,980,390	4	\$2,842,560	5
Severe Thunderstorm	\$127,219,040	779	\$2,980,390	4	\$2,842,560	5
Severe Winter Storm	\$127,219,040	779	\$2,980,390	4	\$2,842,560	5
Tornado	\$127,219,040	779	\$2,980,390	4	\$2,842,560	5
Drought	\$18,726,470	28	-	-	\$489,930	1
Flood						
1% Annual Chance	\$10,552,420	64	\$806,330	2	\$489,930	1
0.2% Annual Chance	\$11,591,710	75	\$806,330	2	\$489,930	1
Earthquakes	\$127,219,040	779			\$2,842,560	5
Wildfire	\$1,287,160	6	-	-	\$489,930	1

2.10. Community Climate Change Challenges

As is with all of the SCCOG communities, the Town of Griswold and the borough have 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 Griswold and Borough of Jewett City

What are the Town's and the Borough's Top Climate Change Concerns?

Flooding: The Town and Borough are concerned with river and stream/road crossings; riverine flood risks to properties in the Borough; and lingering dam safety concerns in the town and in the borough.

Extreme Heat: The Town and Borough share concerns about vulnerable elderly and home-bound people. Transportation options are needed, as well as reliable options for cooling in place.

Others: Septic systems in the Lake Road area could be at increasing risk of failure during extreme precipitation and riverine flood events.

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

Flooding: Pursue funding for the acquisitions or elevations of condominium units on South Main Street that were flooded in March 2010; and support other acquisitions as funding allows.

Extreme Heat: Ensure that the new senior center and old senior center building are fitted with appropriate amenities and access to be used as cooling centers; and secure reliable transportation options for people to access cooling centers.

Others: Conduct a feasibility study for addressing septic system challenges in the Lake Road area, either through sewer extension, septic system relocations, or installation of a community subsurface sewage disposal system.

3. Extreme and Severe Storms

3.1. Climate Change Impacts

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

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

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

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

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

3.2. Hurricanes and Tropical Storms

3.2.1 Setting and Recent Occurrences

Several types of hazards may be associated with tropical storms and hurricanes including heavy or winds, heavy rains, and flooding. Wind hazards are widespread and can affect any part of Griswold. However, some buildings within town are more susceptible to wind damage than others.

Tropical Storm Irene impacted the region in August 2011. Branches, trees, utility lines, and other items fell throughout town, while areas along roads and near residences being the hardest hit areas. Electricity was lost to the entire town for approximately two and a half weeks following Tropical Storm Irene. On

October 29, 2012, Griswold felt the effects of Super Storm Sandy, a hybrid storm with both tropical and extra tropical characteristics. This storm caused widespread power outages, lasting a week or more. High winds felled trees, taking down power lines, and making many roads impassable.

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

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

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

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

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

3.2.2 Existing Capabilities

Existing mitigation measures appropriate for flooding have been discussed in Section 2.0. These include the ordinances, codes, and regulations that have been enacted to minimize flood damage.

Preparedness

The Fire Company regularly performs training exercises to prepare for events including Category 3 and 4 Hurricanes.

Tree Maintenance

Parts of trees (limbs) or entire tall and older trees may fall during heavy wind events, potentially damaging structures, utility lines, and vehicles. Two utility companies provide power within Griswold; the Jewett City Power Utility serves Jewett City Borough, while Eversource serves the rest of the Town. Both utilities provide tree maintenance near their power lines. 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. Town staff report that tree trimming and removal by Eversource has been extensive, especially along Rixtown Road (where over 37 miles of trimming has occurred). Tree maintenance is prioritized based on reported outages. While maintenance practices have improved since the previous HMP edition, the Town still experiences many outages.

Power outages are reportedly not a problem in Jewett City. Tree maintenance is performed by the Department of Public Works.

The town has a Tree Warden which works off the Public Works' budget that includes \$25,000 per year for tree maintenance; this is a substantial increase from the \$5,000 budget noted in the 2017 HMP. The Public Works staff trims smaller trees, while jobs involving larger trees and those near power lines have historically been contracted out. The Town has been reimbursed by FEMA for costs exceeding the regular budget once or twice.

All utilities in new subdivisions must be located underground whenever possible in order to mitigate storm-related damages. However, Griswold has no plans to bury existing utilities because of the high cost to do so. Main Street alone would be in exceedance of six million dollars. The power lines are not municipally owned, and the project would be very expensive. This being said, there are very few areas where utilities are underground.

Debris Management

Griswold collects and performs chop/chip operations on debris during and after storms. Excess debris is stored at the Town transfer station until it is processed; with the field in front of the Public Works building has a backup brush disposal area. The Town is also a member of the SCCOG incinerator agreement that allows it to borrow equipment and utilize the incinerator to dispose of excess debris as needed.

Wind Loading

Wind loading requirements are addressed through the state building code. The 20022 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 ultimate design wind speed for Griswold is 125 with a basic design wind speeds ranging from 120 to 140 miles per hour. Design speeds used vary depending on the building use (for example, hospitals must be designed to the higher wind speed). Note that changes in design wind speed figures 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. Griswold 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.

Griswold's structure stock consists of many historic buildings and homes greater than 50 and sometimes 100 years old. According to the town's POCD there are seventeen structures in Griswold that have been listed on the State Register of Historic Places. In addition, 119 properties within the Borough of Jewett City and 73 properties in the remaining land of Griswold are historically and/or architecturally significant to the history of the town. There are also four mobile home parks in Griswold which are often more susceptible to wind damage. Mobile home parks are located on Hopeville Road, Norman Road, Glasgo Road, and Sheldon Road.

According to town officials, town-owned critical facilities do not have wind-mitigation measures installed to specifically reduce the effects of wind. Thus, it is possible that nearly all of the critical facilities in Griswold could be damaged by hurricane-force winds as any other structures.

Newer critical facilities, such as the Griswold Middle School, meet current building code requirements and are therefore considered to be the most resistant to wind damage even if they are not specifically wind resistant for hurricane gusts. Note that the high school is not specifically designed to withstand hurricane force winds, and this is something the town is concerned with if used as a shelter in its current design during a high-wind weather event.

Sheltering Needs

The Town 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 increased since the 2012 edition of the hazard mitigation plan was adopted, especially in the areas of tree maintenance and preparedness.

3.2.3 Vulnerabilities and Risk Assessment

As noted in Multi-Jurisdictional document, the region has experienced a number of significant storms in recorded history. The most recent storms include Tropical Storm Isaias and Hurricane Ida, which resulted in extensive damage throughout the state. Additional details on these storms and general data on winds speeds and damage can be found in the Regional Plan. Griswold is located away from the shoreline; however, the town is still vulnerable to flooding from water bodies during tropical storms or hurricanes and is as susceptible 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.

Damage to trees and buildings, and resulting power outages, as a result of winds has historically been one of the most problematic issues facing Griswold during storms with high winds. Mitigating damage to utility lines and infrastructure and property and injury or loss of life must be implemented. Mitigation for wind damage is therefore a large component in the success of common storms which impact Griswold. As a result, the following further describes the importance of ongoing tree maintenance in town.

3.2.3.1 Hazard Losses

The Town of Griswold received \$29,051 in FEMA Public Assistance (PA) funds in the wake of Hurricane Isaias. These funds are the federal share of the eligible costs associated with the hurricane, which were a total of \$32,279. All of these federal funds were received for townwide debris removal (Figure 3-1). Since 2012, the town has received \$78,395 in FEMA PA funds (including Isaias) for project costs of \$90,802.

In addition to PA, FEMA offers Individual Assistance (IA) to property owners and renters. In the wake of Hurricane Ida, one property owner in Jewett City received IA in the amount of \$6,310.

FEMA HAZUS-MH 6.0 was used to develop losses associated with seven probabilistic hurricane scenarios from the 10 year to 1,000 year return period. Losses include economic loss, building damages, debris, and sheltering needs. Table 3-1 through Table 3-3 through presents hurricane related damages for the Town of Griswold. 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.

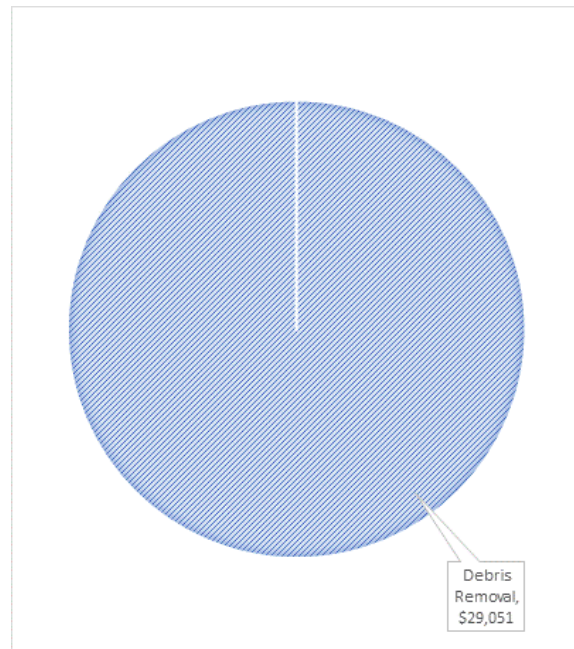


Figure 3-1 Hurricane Isaias Funding Categories

Table 3-1 HAZUS-MH Hurricane Related Economic Impacts

Griswold	Return Period	Residential	Commercial	Industrial	Others	Total
	10-year	\$146,750	\$0	\$0	\$0	\$146,750
	20-year	\$2,097,120	\$61,170	\$5,390	\$24,540	\$2,188,220
	50-year	\$10,002,680	\$650,860	\$39,880	\$167,300	\$10,860,720

	100-year	\$19,283,590	\$2,119,910	\$146,880	\$1,176,390	\$22,726,770
	200-year	\$34,493,210	\$4,833,870	\$430,260	\$2,977,760	\$42,735,100
	500-year	\$65,527,550	\$10,567,290	\$1,154,800	\$6,278,400	\$83,528,040
	1,000-year	\$96,532,280	\$16,331,630	\$1,910,200	\$8,487,280	\$123,261,390

Table 3-2 HAZUS-MH Hurricane Related Building Damage

Griswold	Return Period	Minor	Moderate	Severe	Destruction	Total
	10-year	2	0	0	0	2
	20-year	14	1	0	0	15
	50-year	196	16	0	0	212
	100-year	463	61	2	2	528
	200-year	766	151	11	7	935
	500-year	1,095	317	40	25	1,477
	1,000-year	1,260	449	77	48	1,834

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

Griswold	Return Period	Debris Generated (Tons)	Households Displaced	Individuals Seeking Temporary Shelter
	10-year	23	0	0
	20-year	318	0	0
	50-year	2,009	0	0
	100-year	3,536	1	0
	200-year	5,805	5	3
	500-year	10,014	25	11
	1,000-year	13,738	55	24

3.3. Tornadoes and High Wind Events

3.3.1 Setting and Recent Occurrences

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

The following is an excerpt from the NCDC database for summer storms that impacted Griswold in the past decade:

- On July 2, 2008, an upper level disturbance produced hail reportedly up to 1.25 inches in diameter and severe wind gusts in southeastern Connecticut.
- On June 26, 2009, supercell thunderstorms formed and tracked across southern Connecticut. Penny size hail was reported in neighboring Lisbon.
- On July 20, 2015, an isolated severe storm cause damage to trees and wires at 5 Lincoln Square in Jewett City.

Other recent severe storm events include:

- On September 6, 2017, a cold front triggered severe storms in 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 June 6, 2020, a tree came down on an unoccupied car on Hill Street in Jewett City as a result of a severe thunderstorm triggered by a cold front.
- 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.

The state has provided NOAA weather radios to all public schools as well as to many local governments for use in public buildings. The general public continues to rely on mass media for knowledge of weather warnings. Warning time for tornadoes is very short due to the nature of these types of events, so pre-disaster response time can be limited. However, the NOAA weather radios provide immediate notification of all types of weather warnings in addition to tornadoes, making them very popular with communities. These warnings include lightning, thunderstorms, and hailstorms.

NOAA radios are stations at the Public Works building. The Griswold First Selectman sends out public emails to residents warning of impending severe weather.

Griswold has a full-time tree warden and an as-needed program for tree trimming. The Public Works Department has equipment to clean up downed tree limbs and brush following major wind events. Depending on the scale of the damage, the town can employ an outside contractor to assist in tree limbs and brush removal following a major wind event.

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, with the exception of changes in tree maintenance described in Section 2.7.

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 Griswold 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, Griswold is not likely to experience a tornado in any given year.

Most thunderstorm damage, typically associated with summer storms, is caused by straight-line winds exceeding 100 mph. Experience has generally shown that wind in excess of 50 miles per hour (mph) will cause significant tree damage during the summer season as the effects of wind on trees is 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 windstorms. Heavy winds can take down trees near power lines, leading to the start and spread of fires and widespread power outages. Such fires can be extremely dangerous during the summer months, especially during dry and drought conditions. Downed trees affecting utility structures are of great concern to Griswold, especially during dry and drought conditions as not all utilities are located underground.

Lightning and hail are generally associated with severe thunderstorms and can produce damaging effects. All areas of town are equally susceptible to damage from lightning and hail, although lightning damage is typically mitigated by warnings and proper grounding of buildings and equipment. Hail is primarily mitigated by warning. These are considered likely events each year, but typically cause limited damage within. Most buildings within town are sufficiently constructed and meet current building codes.

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

3.3.3.1 Hazard Losses

Since 2017, there have been two NOAA reported events and losses associated with a severe storm and wind event. One in Griswold on November 13, 2021, in which multiple large trees were reportedly down; losses were reported at \$1,000. The second was in Jewett City on June 5, 2020, where severe storm winds brought a tree down on an unoccupied vehicle causing \$6,000 in damages.

Since 2012 there have been five reports for thunderstorm wind events; one of which was for hail in Jewett City, the other four were for wind events. The total losses reported since 2012 total \$13,000.

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 thunderstorms and tornadoes, winter storms have the potential to affect any part of Griswold. However, unlike summer storms, winter events and the hazards that result (wind, snow, and ice) have more widespread geographic extent. The entire town is therefore 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.

Winter storms and nor'easters have affected Griswold since the last HMP. During the winter of 2011, when the region received record-breaking snowfall amounts, Griswold assessed all flat-roofed buildings. The Pachaug Town Hall, which is now a historic building that is primarily used as a meeting space, was temporarily closed due to snow load concerns. Town employees did not perform any shoveling of roofs during the season. Griswold High School is outfitted with a structural monitoring system that monitored snow loading on the roof and noted that the load reached a critical status. There were a small number of residential failures and a few mobile home roofs that were damaged.

- Winter storm Alfred in October 2011 led to downed trees and electrical outages in different areas of town, which was attributed partly to wind damage rather than snow load damage.
- On January 31, 2013, a strong winter storm damaged trees in Jewett City. Although the precipitation fell as mostly rain, the high winds of 60-70 miles per hour cause extensive tree damage throughout the area.
- Heavy snow from two storms impacted the region in February and March 2013. Several feet of snow fell between the two storms, taxing the town's snow removal abilities. The town received approximately \$50,000 to cover expenses related to the storms.
- Large quantities of snow over the winter of 2015 caused the roof of a chicken coop to collapse, as well as an old farmhouse. Neither was owned by the Town. FEMA funding was reportedly granted to the Town for recovery efforts.

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

As it is almost guaranteed that winter storms will occur annually in Connecticut, it is important for municipalities to budget fiscal resources toward snow management. Snow is the most common natural hazard requiring additional overtime effort from town staff, as parking lots and roadways need constant maintenance during storms. Collectively, the Connecticut DOT and the Griswold Public Works Department (PWD) conduct the majority of plowing in Griswold. The Connecticut DOT plows the state routes as well as Interstate 395 in town, while Griswold PWD takes care of all municipal roads. Private roads are not plowed by the town. The PWD has set plowing routes and maintain a supply of sand and salt.

Since the previous HMP, the Town has upgraded much of its snow-management equipment, including the purchase of high-output plows. These upgrades have been paid for using the Town budget. The Town's capability and reliability with regard to road clearing has improved, as evidenced by positive feedback from Town residents.

The town must ensure that all warning/notification and communications systems are ready before a storm and ensures that appropriate equipment and supplies, especially snow removal equipment, are in place and in good working order. There are a few steep roads in Griswold including Norman Road which is a historic road where drivers have historically become stranded. The application of additional sand and salt typically suffices to improve access. The Town continually assesses areas that are difficult to access during winter storm events to ensure it is able to access all areas.

The Connecticut Building Code specifies that a weight of 30 pounds per square foot be used as the base "ground snow load" for computing snow loading for different types of roofs. After the roof collapses of 2015, the Town developed a new roof-clearing policy that focuses on removing snow from the backside of the Senior Center and from the roofs of the Dog Pound Kennels to avoid collapse.

The Fire Department and the Senior Center administration check on homeless people during severe cold weather events.

Summary

In general, municipal capabilities to mitigate snowstorm damage have not increased significantly since the 2017 edition of the hazard mitigation plan was adopted. This is because the Town continues to experience heavy snow each winter and has allocated resources to address the risks.

3.4.3 Vulnerabilities and Risk Assessment

This section focuses on those effects commonly associated with winter storms, including those from blizzards, ice storms, heavy snow, freezing rain, and extreme cold. Warning and education can prevent most injuries from winter storms. Most deaths from winter storms are indirectly related to the storm, such as from traffic accidents on icy roads and hypothermia from prolonged exposure to cold. Damage to trees and tree limbs and the resultant downing of utility cables are a common effect of these types of events. Often, tree limbs on roadways are not suited to withstand high wind and snow or ice loads. Secondary effects can include loss of power and heat. Further "flood" damage could be caused by flooding from frozen water pipes.

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. Town officials note that very few areas are difficult to access during the winter. In addition, Town officials report that there have been no historical ice jam issues on the Pachaug or Quinebaug Rivers.

3.4.3.1 Hazard Losses

There have been no reported winter storm losses for Griswold since 2017. In the past decade, the town has received FEMA PA reimbursements in the amount of \$108,546 for winter storms. Downscaled losses based on the 2019 Connecticut Natural Hazard Mitigation Plan are developed in the Multi-Jurisdictional document.

4. Sea Level Rise

4.1. Climate Change Impacts

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

The University of Connecticut, Connecticut Institute for Resilience and Climate Adaptation (CIRCA) has, in accordance with state statute, developed local sea level rise projections for communities to use as a planning threshold (Figure 4-1). CIRCA recommends that communities plan for 0.5 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).

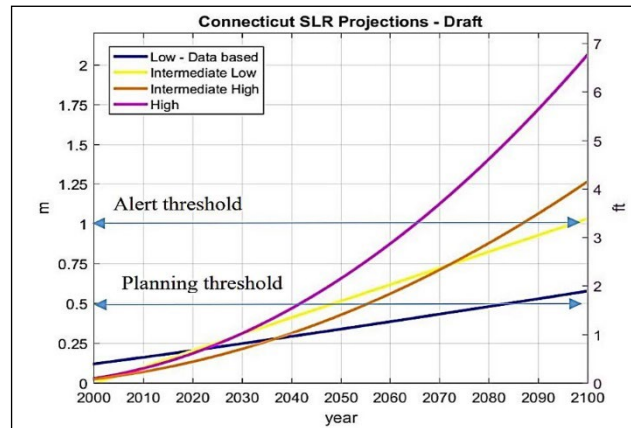


Figure 4-1 Four Localized Sea Level Rise Scenarios for

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

Griswold 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, Griswold is considered to be immune to the direct effects of coastal flooding and storm surge.

4.2.2 Existing Capabilities

Griswold does not require any regulations to restrict development due to coastal flooding hazards.

4.2.3 Vulnerabilities and Risk Assessment

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

4.2.3.1 Hazard Losses

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

4.3. Shoreline Change

4.3.1 Setting and Recent Occurrences

Griswold is not located along the coastline or along any tidally influenced river. Therefore, Griswold is considered to be immune to the direct effects of shoreline change.

4.3.2 Existing Capabilities

Griswold does not require any regulations to restrict development due to shoreline change and coastal erosion.

4.3.3 Vulnerabilities and Risk Assessment

No areas of Griswold are vulnerable to shoreline change.

4.3.3.1 *Hazard Losses*

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

5. Changing Precipitation

5.1. Climate Change Impacts

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

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

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

5.2. Riverine and Pluvial Floods

5.2.1 Setting and Recent Occurrences

In general, the potential for flooding in Griswold is concentrated in areas along established SFHAs. SFHAs in Griswold are delineated on a Flood Insurance Rate Map (FIRM) and Flood Insurance Study (FIS). The FIRM delineates areas within Griswold 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 Griswold are mapped as Zone AE while Clayville Pond, Stone Hill Reservoir Dam, Crooked Brook, Sheep Barn Brook, Doanville Pond, and Billings Brook are mapped as Zone A.

There are many Zone A floodplains in Griswold. These floodplains are difficult to work with because it is hard to determine if a property is actually in the floodplain based on elevation. The town believes that there are errors in the FEMA floodplain defined for the Pachaug River but commissioning a new FEMA study is difficult and conducting a new study is very expensive.

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 has also been a common problem in different inland areas in Griswold.

The March 2010 storms continue to be considered the event that caused the most widespread flooding in Griswold since the town began participating in the multi-jurisdiction hazard mitigation plan:

- Many Griswold roadways were flooded during the March 2010 rain events. The roadways that were flooded include Sheldon Road, Cross Road, Mill Road, Carol Road, Sibicky Road, Ashland Street, Lilly Pond Road, South Main Street, Anthony Street, K of C Drive, Wedgewood Drive,

Hopeville Road between Monroe, and Lake Roads, Burlenson Lane, Shetucket Turnpike (Route 165) near the bridge area between the ponds, Brewster Road at Route 164, and Terry Road.

- Route 138 was inundated by three to four feet of water during the flood of March 2010. As a result, the roadway was closed for three to five days.
- Approximately 35 condominium units on South Main Street were flooded during the storm of March 2010. In this area, two condominium complexes close to the Quinebaug River lie within the SFHA floodplain and/or the 0.2 percent annual chance floodplain.

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

5.2.2 Existing Capabilities

The Town and Borough have in place a number of measures to mitigate flood damage. These include regulations, codes, and ordinances preventing encroachment and development near floodways, and monitoring efforts and emergency services. The town attempts to mitigate flood damage and flood hazards by utilizing a wide range of measures: restricting activities in areas of flood risk, replacing and upsizing bridges, promoting flood insurance, maintaining drainage systems, advancing education and outreach, and utilizing warming systems. While there is currently no municipal budget specifically for flood hazard mitigation, dollars are spent for the reduction of flood damage through the acquisition of open space, drainage systems improvements, education, staffing and other areas.

As mentioned in Section 2.6 above, the Borough of Jewett City has a flood ordinance, while flooding regulations in the remainder of Griswold are in Section 11.4 of the Zoning Regulations. Chapter 9 of the Griswold Town Code is entitled "Flood Damage Prevention and Control," and the Planning and Zoning Commission, the Inland Wetlands Commission, and the Building Department are all charged with reviewing projects and developments in SFHAs as well as projects not located in SFHAs that will alter hydrology and runoff. A comprehensive set of Flood Regulations for all of Griswold was published in July 2011. These regulations are Griswold's articulation of the NFIP regulations. FEMA is currently working on updating flood mapping in certain parts of the region, including in Griswold. It is expected that new FEMA Flood Insurance Rate Maps (FIRMs) will be available in August 2023 and will be effective October 2025. These updates should then be incorporated into zoning regulations. Recent and ongoing flood mitigation is described below.

The Carol Road Bridge removal has made significant progress since the 2017 plan. The actual removal of the bridge is anticipated to go out to bid in late 2022, and ultimately the road will be turned into a cul-de-sac. This is anticipated to be complete by end of 2023.

Both bridges on Bitgood Road over the Pachaug River have recently been replaced and upgraded to provide adequate conveyance for a 1% annual-chance storm event. The Edmond Road Bridge over the Pachaug has been similarly replaced and upgraded.

The Public Works Department is in charge of the maintenance of the Griswold's drainage systems and performs clearing of bridges and culverts and other maintenance as needed. Drainage complaints are routed to the Public Works Department and recorded. The town uses these reports to identify potential problems and plan for maintenance and upgrades. Griswold officials also have a wish-list of potential projects including the re-routing of drainage on Sheldon Road (discussed further in Section 5.2.3) and either the acquisition of a floodprone property on Popple Bridge Road or a drainage upgrade to the road. Some improvement has been made to drainage along Sheldon Road with the replacement of a fifteen-foot culvert with two eighteen-foot culverts near Carol Road.

The town maintains a list of scour-prone critical bridges which are inspected during floods. These include Edmond Road over the Pachaug River, Bitgood Road over Hopeville Pond (Pachaug River), Sheldon Road over Doaneville Brook, Norman Road over the Pachaug River, and Ashland Street over the Pachaug River.

Griswold is continually working to improve its road and bridge infrastructure, especially with regards to flood resilience. Additional bridge replacements or removals are scheduled for the next five years, including:

- Replacement of the bridge on Sheldon Road over Doaneville Pond to 1% annual-chance storm capacity
- Replacement of the bridge on Norman Road over Ashland Pond to 1% annual-chance storm capacity

Griswold Public Works stores sandbags and pallets for their transportation at the DPW garage. There are six pallets pre-loaded with filled bags ready for deployment from that site in case of imminent flooding. These bags are washed and reused after events.

Griswold joined the Avalonia Land Conservancy, Inc. Land Trust in 1972, combining with the founding Towns of Groton, Ledyard, North Stonington, and Stonington. Also joining in 1972 were the Towns of Preston and Voluntown, while Sprague was added in 2007. Avalonia works with the municipalities, including Griswold, to assist with the acquisition of potential floodprone property in Griswold. The Avalonia Land Conservancy acquired Bartons Island in Pachaug Pond in 2011.

Summary

In general, municipal capabilities to mitigate flood damage have not increased slightly since the 2017 edition of the hazard mitigation plan was adopted. This is likely because the Town and Borough have invested resources in public works, roadway, and drainage projects.

5.2.3 Vulnerabilities and Risk Assessment

This section discusses specific areas at risk to flooding within Griswold. Inland flooding due to poor drainage and other factors is also a persistent hazard in the town and can cause minor infrastructure damage, expedite maintenance, and create nuisance flooding of yards and basements.

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 and Borough. The distribution of flood vulnerability throughout the community can be seen in Figure 5-1. The CCVI demonstrates that flood vulnerability in the ranges primarily from low to moderate, with some areas having high vulnerability. Most of the vulnerability score is due to the Quinebaug River.

Vulnerability Analysis of Areas Along Watercourses

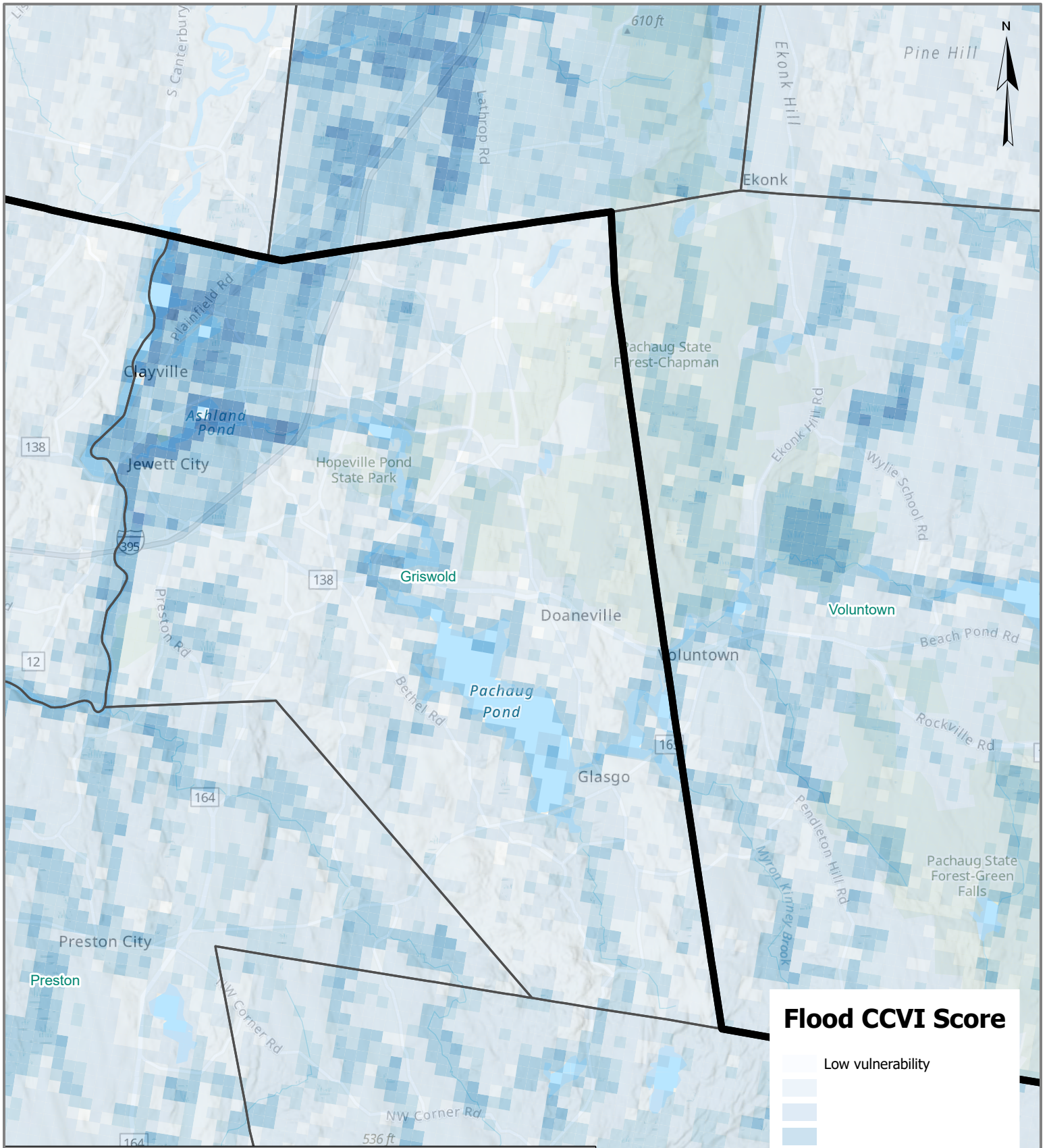
The two main rivers that contribute to flooding in Griswold are the Quinebaug River and the Pachaug River. The Quinebaug River flows southwest from Massachusetts into Connecticut to its confluence with the Shetucket River, approximately three miles above Norwich, Connecticut. The Quinebaug River is approximately 62 miles long and the principal tributaries are the French, Five Mile, Moosup, and Pachaug Rivers. In Griswold, the Quinebaug River forms the western corporate limits. The Pachaug River flows through Griswold to its confluence with the Quinebaug at Jewett City. Buildings located in flood hazard areas are primarily residential but also include some commercial, industrial, and critical facility structures. The majority of the structures that are threatened by flooding are located within the SFHA floodplain. Refer to Figure 5-2 for a depiction of SFHAs in Griswold.

Griswold has several major transportation routes, which include Interstate 395, Route 201, and Route 138. A series of crossings of the highway have been constructed to allow passage of roadways under and over I-395.

There are several roads throughout Griswold which have the potential to flood. These roads include Bitgood Road, Route 138, Old Bethel Road, Norman Road, and Edmund Road along the Pachaug River. The replacement of the Bitgood Road and Edmund Road bridges has decreased the risk of flooding on those roads. The planned replacement of the Norman Road Bridge should decrease that road's flood risk.

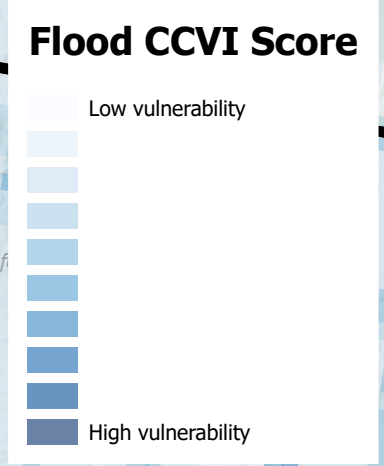
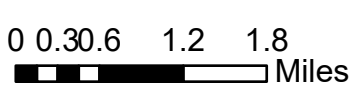
Route 138 was inundated with three to four feet of water during the floods of March 2010. As a result, the road was closed for three to five days. Other roads also of concern are Rhode Road intersected by Mill Brook, and Banjo Sullivan Road and Campbell Road along Crooked Brook. These roads could inhibit vehicle travel during severe storms.

Many other roads were inundated to different extents during the March 2010 storm including: Sheldon Road, Cross Road, Mill Road, Carol Road, Sibicky Road, Ashland Street, Lilly Pond Road, South Main Street, Anthony Street, K of C Drive, Wedgewood Drive, Hopeville Road between Monroe and Lake Roads, Burlenson Lane, Shetucket Turnpike (Route 165) near the bridge area between the ponds, Brewster Road at Route 164, and Terry Road. Because several homes have flooded along Mill Road the town submitted a funding application for acquisitions; this application was unsuccessful.



Flood CCVI Score

SCCOG Hazard Mitigation and Climate Adaptation Plan
 Town of Griswold and Borough of Jewett City
 1/17/2023



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

The culvert at the intersection of Carol Road and Sheldon Road has historically had difficulty conveying water but has recently been replaced with two higher-capacity culverts. Backwater conditions in Mill Pond (a small impoundment of the Pachaug River upstream of Carol Road) continue to be an issue, causing water to flow down Sheldon Road. Structures are not affected by this flooding; however, the road does wash out and is damaged. The Mill Pond is impounded by a private dam directly beneath the bridge on Carol Road. The constriction between the dam and the low chord of the bridge is a contributing factor to the flooding, but the dam was installed by an "act of congress" and cannot be removed easily. Griswold would like to remove the bridge on Carol Road, and possibly remove the dam altogether.

Approximately 35 condominium units were flooded on South Main Street during the flood of March 2010. Two complexes in Griswold lie within the SFHA floodplain and/or the 0.2 percent annual chance floodplain. Along the same lines, three homes on Burlson Lane were inundated during the March 2010 event. Three homes in the area appear to fall within the SFHA floodplain, with additional homes appearing to lie in the 0.2 percent annual chance floodplain. Construction beneath Ashland Street may have contributed to the Burlson Lane flooding.

The Lakeview Mobile Home Park on Sheldon Road is located adjacent to Doaneville Pond, an impoundment of the Pachaug River. Although the Park is located outside of the Zone A SFHA, the Park was inundated by three to four feet of water during the March 2010 flood. Water essentially reached the bottom of each unit, and access to the area was difficult. Residents needed to be relocated and sheltered.

Water reached up to six feet deep in the basement of two houses on Mill Road (private road) during the March 2010 storms. It is not known whether the property owners made an insurance claim. One residence experienced a subsequent fire which rendered the property uninhabitable. Griswold is pursuing removal of the Rubber Pond dam, an action it expects will decrease flood risk in this area. There is a Zone A floodplain in the area from Doaneville Pond, but it does not intersect any structures.

The WWTP is located at the end of Wedgewood Drive by the Quinebaug River. Part of the facility is located in the floodplain. At the time of the previous edition of this HMP, Griswold had tentative approval from the State of Connecticut and FEMA to receive grant funding under the HMGP to extend a floodwall around the facility pending completion of this HMP update; however, that funding was never granted. The Town intends to continue to pursue funding for the floodwall extension.

Recently, there have also been challenges along Slater Avenue. A culvert which passes underneath Interstate 395, and then under the High School is presumably blocked or having capacity issues. During the past few rainstorms, this culvert has cause flood waters down Slater Avenue, and some manhole covers along the road have also surcharged during severe rain events. Much of the area where drainage issues are happening is private property and they cannot easily investigate.

The Lake Road community, which is situated along Ashland Pond, also faces a unique challenge regarding septic system vulnerability. Many of the homes in this community have low-lying septic systems that are at-risk of flooding or washing out when the pond floods during heavy rain events. Many of these properties are constrained due to lot sizes and age. While a sewer line extension project is

occurring nearby in the future, this community is much lower than the anticipated line, making potential hookups a challenge.

Vulnerability Analysis of Private Properties

Based on a review of the Town of Griswold's Flood Insurance Rate Maps and topographic maps, residential structures that are subject to flooding during significant flood events are near the Quinebaug River. One area of concern along the Quinebaug River is near Arbor Road. There are several structures along the Quinebaug that are in flood hazard areas.

Griswold's main area of commercial and industrial development is in the Borough of Jewett City. The confluence of the Quinebaug and Pachaug Rivers is south of the Borough of Jewett City. Several other ponds such as the Aspinook Pond, Ashland Pond, and Clayville Pond border this commercialized area of Griswold. The developed areas in Jewett City appear to be free from flooding, which reduces the hazard potential. The majority of structures in a mapped floodplain are located adjacent to the Hopeville and Pachaug Ponds on the Pachaug River.

Based on correspondence with the State of Connecticut NFIP Coordinator, there are no repetitive loss properties (RLPs) located in Griswold. Griswold 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. Those instances where private homes became inundated were often associated with flooding from waterways. These events are outlined below.

- Approximately 35 condominium units were flooded on South Main Street during the rainstorms of March 2010. There are two complexes near the Quinebaug River that lie within the SFHA floodplain and/or the 0.2 percent annual chance floodplain.
- Three houses flooded on Burlson Lane during the March of 2010 floods. Three homes in this area appear to be in the SFHA floodplain, with additional homes in the 0.2 percent annual chance floodplain. Constriction under Ashland Street may have contributed to the flooding.
- The Lakeview Mobile Home Park on Sheldon Road is located adjacent to Doanville Pond, an impoundment of the Pachaug River. Although the park is located outside of the Zone A SFHA floodplain, the park had three to four feet of water in following the flood of March 2010. Water was essentially up to the bottom of each unit, and access to the area was difficult. Residents needed to be relocated and sheltered.
- Water reached up to six feet deep in the basement of two residences on Mill Road during the floods of March 2010. It is unclear to the town if the property owners made insurance claims. One of the homes had a subsequent fire and the property became uninhabitable. Griswold is considering this property to be a potential acquisition project. There is a Zone A floodplain in the area from Doanville Pond. Although, it does not intersect any structures.
- A house on Popple Bridge Road was another acquisition project submitted under the HMGP. The home had 10 to 12 feet of water in the backyard during the storm of March 2010. The water infiltrated through the retaining wall and flooded the basement. The Fire Department had to pump out the basement for 28 consecutive hours until the floodwaters receded. The homeowner did not submit a flood claim so there is no record of the damage, so the mitigation

funding application was ranked relatively low. Griswold would like to purchase the property and turn it into a retention area, but so far has not succeeded in this effort. The Town has placed a drainage easement on neighboring property owners to install improved drainage infrastructure. The Town also hopes that removal of the Rubber Pond Dam will lower flood risk here.

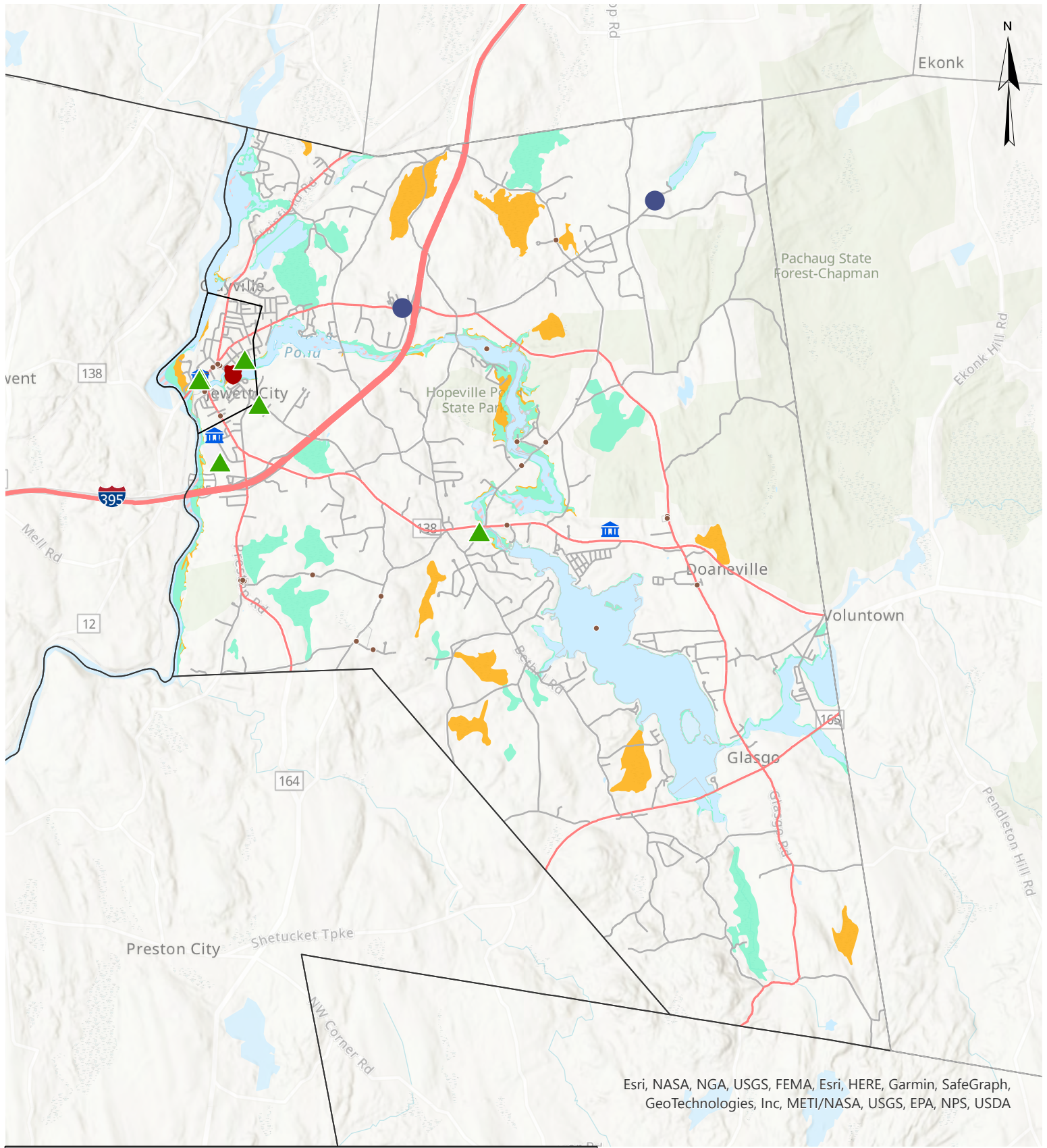
- Those properties located in floodplains, but not included in town officials' list of significant inundation include:
- Camper's World, an RV camping park, is located in the floodplain of the Pachaug River adjacent to Hopeville Pond.
- Residences on Mallard Point are located in the SFHA of Hopeville Pond.
- A residence on Rill Brook Road is located in the floodway of the Pachaug River.

Vulnerability Analysis of Critical Facilities

The majority of Griswold's critical facilities are located in the Borough of Jewett City and are not in flood hazard areas. One exception to the majority is the Griswold Volunteer Fire Department, Station 55, which is the town's EOC as well as the town's primary shelter equipped with a generator purchased in July 2011 and able to accommodate 50 people. Station 55 is located at 883 Voluntown Road (Route 138) at the intersection of Voluntown Road and Old Bethel Road and borders Zone AE. However, Station 55 did not flood during the floods of March 2010. During the March 2010 event, Route 138 had three to four feet of flooding from the Pachaug Pond and the Pachaug Pond Dam (Class C). CT DOT and the town closed the road for three to five days.

The town had previously wished to add a retaining wall at Station 55; however, they now believe that the FEMA mapping in this area is out of date and places the Fire Station closer to the floodplain than it truly is. They wish to reassess the floodplain extent before pursuing construction of a wall.

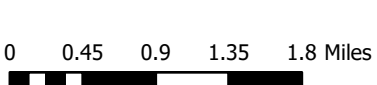
The Jewett City WWTP is located at the end of Wedgewood Drive by the Quinebaug River. Part of the facility is located in both the SFHA AE zone and Zone X 0.2 percent annual chance floodplains. Griswold continues to pursue construction a floodwall around the facility.



Esri, NASA, NGA, USGS, FEMA, Esri, HERE, Garmin, SafeGraph, 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 Griswold
 Date: 8/1/2022



Legend

- Historic Resources
- Emergency Services
- Municipal
- Other Infrastructure and Facilities
- ▲ Shelter or Cooling Center
- 1% Annual Chance Flood Hazard Area
- .2% Annual Chance Flood Hazard Area
- Floodway

5.2.3.1 Hazard Losses

According to NFIP statistics, as of June 30, 2022, the Town of Griswold has had a total of 5 flood related losses, with a total \$23,735 paid towards the claims. The Borough of Jewett City has also had 5 claims totaling \$15,557.

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

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

Griswold	2022 Results				
	Residential	Commercial	Industrial	Other	Total
Direct					
Building	\$21,400,000	\$6,720,000	\$960,000	\$2,000,000	\$31,080,000
Contents	\$11,810,000	\$19,570,000	\$2,740,000	\$11,780,000	\$45,900,000
Inventory	\$0	\$2,570,000	\$390,000	\$210,000	\$3,170,000
Subtotal	\$33,210,000	\$28,860,000	\$4,090,000	\$13,990,000	\$80,150,000
Business Interruption					
Income	\$20,000	\$14,660,000	\$90,000	\$1,800,000	\$16,570,000
Relocation	\$5,330,000	\$3,560,000	\$50,000	\$2,300,000	\$11,240,000
Rental Income	\$3,390,000	\$2,540,000	\$20,000	\$790,000	\$6,740,000
Wage	\$40,000	\$15,600,000	\$160,000	\$59,890,000	\$75,690,000
Subtotal	\$8,780,000	\$36,360,000	\$320,000	\$64,780,000	\$110,240,000
Total	\$41,990,000	\$65,220,000	\$4,410,000	\$78,770,000	\$190,390,000

5.3. Drought

5.3.1 Setting and Recent Occurrences

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

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

- **2016** – a statewide drought that lasted almost two years and peaked in 2016, resulted in water conservation efforts throughout the southeastern part of the region, elevated fire risks in some areas, and was noted as the 11th driest spring on record.
- **2020** – From June to December, New London County experienced a moderate to severe drought, with the county being declared a Stage 3 by the Connecticut Interagency Drought Work Group.

- **2022** – As of the development of this plan, the region is in an ongoing drought, with severe drought conditions having occurred in August 2022. The County was declared a Stage 3 drought emergency on August 18.

5.3.2 Existing Capabilities

The Town of Griswold, like many other communities, does not have specific regulations that are geared toward drought mitigation.

The Zoning Regulations have specific purposes and regulations that aid in water conservation and drought resilience. One primary purpose of the Business District is to eliminate any use that create an unreasonable impact on water supplies. In addition, mixed used developments shall be serviced by public water, ultimately increasing resilience for these developments.

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 Griswold 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 Griswold is vulnerable to drought, but the degree of vulnerability varies. A majority of the town relies on private wells for their residential or commercial drinking water. These wells be also impacted during a drought, limiting water supplies. Agricultural operations in town, including growers and livestock farms, may also feel the impacts during droughts as water supplies for irrigation or livestock watering may become stressed.

5.3.3.1 Hazard Losses

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

5.4. Dam Failure

5.4.1 Setting and Recent Occurrences

Dam failures can be triggered suddenly with little or no warning and often in connection with natural disasters such as floods and earthquakes. Dam failures can occur during flooding when the dam breaks under the additional force of floodwaters. In addition, a dam failure can cause a chain reaction where the sudden release of floodwaters causes the next dam downstream to fail. While flooding from a dam failure generally has a limited geographic extent, the effects are potentially catastrophic depending on the downstream population.

The risk of a dam failure affecting Griswold is considered to be moderate as the town has seven known dams classified equal to or higher than Class B. According to town officials, there are no known historical failures causing damage in Griswold.

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.

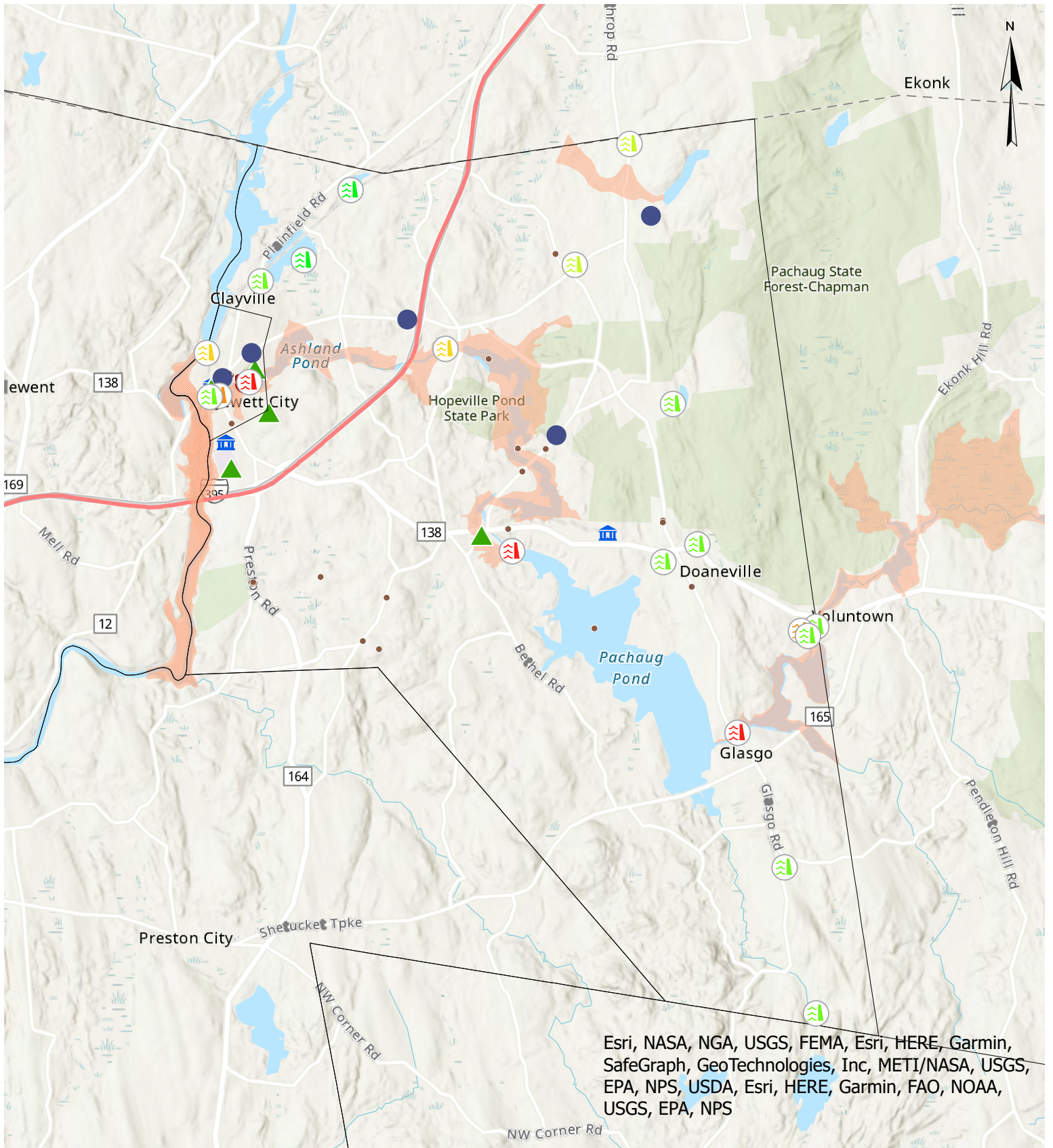
In Connecticut, the owners of Class C dams are required to maintain EAPs. According to Connecticut DEEP Dam Safety files, a dam failure analysis was available for the Glasgo Pond Dam, Ashland Pond Dam, Pachaug Pond Dam, and Aspinook Pond Dam as shown in Figure 5-3 . Dams with an EAP on file at the same location include the Saw Mill Pond dam, Stone Hill Reservoir Dam, Ashland Pond Dam, and Pachaug Pond Dam.

The Griswold Emergency Manager monitors dams and the status of their EAPs. The Town also reports to the CT DOT on the state of scour-critical bridges; often bridge and dam inspections are performed simultaneously.

Griswold is attempting to have the State take over ownership of the Carroll Row Dam.

Summary

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

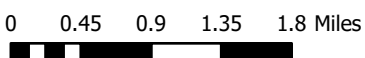


Esri, NASA, NGA, USGS, FEMA, Esri, HERE, Garmin, SafeGraph, GeoTechnologies, Inc, METI/NASA, USGS, EPA, NPS, USDA, Esri, HERE, Garmin, FAO, NOAA, USGS, EPA, NPS

Dams and Dam Failure Inundation Areas

Southeastern Connecticut Council of Governments
Town of Griswold

Date: 2/23/2023



Legend

Dams

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

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

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 CT DEEP Dam Safety Program, as of September 2022,, there are 13 DEEP-registered dams within Griswold, of which five are Class A, one is Class AA, four are Class B, and three are Class C. High and significant hazard dams in Griswold are listed in Table 5-2. This HMP section primarily discusses the possible effects of failure of both high potential hazard (Class C) dams and significant hazard (Class B) dams.

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

CT Dam#	Dam Name	Dam Class	Owner Type
5809	Trailer Park Pond Dam	A	Municipal
5814	Cemetery Pond Dam	A	Private
5816	Crooked Brook Pond Dam	A	Private Club
5817	United Aka Lower Slater Pond Dam	A	State Owned
5818	Heron Marsh Dam	A	State Owned
5823	Pachaug Club Pond Dam	AA	Private Club
5802	City Aka Upper Slater Pond Dam	B	State Owned
5803	Stone Hill Reservoir Dam	B	Water Utility
5807	Hopeville Pond Dam	B	State Owned
5811	Aspinook Pond Hydro Dam	B	Power Utility
5801	Glasgo Pond Dam	C	State Owned
5804	Ashland Pond Dam	C	State Owned
5805	Pachaug Pond Dam	C	State Owned

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.

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 dams in Town could also have impacts on human life and property within Griswold although these are not discussed in favor of the higher classes.

- Glasgo Pond Dam (No. 5801) is a Class C dam located on the Pachaug River at the western end of the Glasgo Pond, adjacent to Glasgo Road (State Route 201). According to a 1977 CT DEEP inspection, the dam is a stone masonry and earth structure formerly used to supply e power and process water to a mill. A stone masonry overflow weir is located at the right abutment. The

outlet works is located in the left section of the dam and is comprised of three sluice gates. The dam has a length of 100 feet, a height of 25 feet, four-foot high abutments, and a stone-faced spillway with a length of 95 feet and a height of 20 feet. The dam impounds a pond with a surface area of 184 acres, watershed of 38 SM and provides 1,800 acre-feet of storage. The pond cannot be lowered in an emergency. The pond is used for recreational purposes and for irrigation in a state forest nursery. A DFA was completed by Lenard & Dilaj Engineering and utilized a ½ PMF storm. The analysis predicted that the pond would overtop the left embankment by 1.2 feet, and that the spillway only had the capacity to convey the 100-year discharge. A new outlet control structure was constructed in 1980. In April 1970, high water in the pond caused residents below the dam to evacuate.

This dam is currently undergoing rehabilitation. Headworks for overflow have been redone, and new top was constructed on the dam.

- City Pond Dam (No. 5802) is a Class B according to the CT DEEP's 2016 inventory; previously this dam had not been included in the State's list of high and significant hazard dams. The dam is located on the Quinebaug River just upstream of Slater Avenue. It is about 500 feet upstream of the United Pond Dam. The hazard class upgrade of this dam represents an elevated risk in Town.
- Stone Hill Reservoir Dam (No. 5803) is a Class B dam located 2.4 miles northeast of the village of Hopeville and 4.9 miles northeast of Jewett City. The dam is located at the southwest end of the reservoir, and the spillway is located 700 feet south of the dam. According to the April 1980 Phase II Report by Lenard & Dilaj Engineering, Inc., the dam was originally constructed in 1894. The reservoir acts as a standpipe for the Jewett City Water Company, providing 1 MGD to the utility, transmitted by four miles of cast iron main. There is no recreation permitted on the reservoir. A watershed of 0.81 SM drains to the Quinebaug River basin by way of the Reservoir Brook from the spillway. The brook flows west to Mill Brook to a large swampy area. Reservoir Brook is approximately 1.5 miles long.

The Stone Hill Reservoir has a surface area of 28.2 acres, is 3,200 feet long and has an average depth of 15 feet. The reservoir depth is 20 feet at the outlet structure. The dam is an earthen embankment structure with a masonry core wall. The dam has a length of 500 feet, a height of 22 feet, a width of 18 feet at the crest and a width of 100 feet at its base. The 1980 Phase II report includes an EAP and Operations Manual. A dam breach flood delineation map was created in 1988 based on a ½ PMF equal to 1,575 cfs. Construction was completed in 1993 on a new emergency spillway, new spillway discharge channel and concrete block wave wall in response to a review by the CT DEEP indicating wave heights of up to 1.7 feet could be generated and that the emergency spillway and dam should be raised.

- Ashland Pond Dam (No. 5804) is a Class C dam located in Jewett City at the western end of the linear Ashland Pond on the Pachaug River 3,000 feet upstream of the confluence with the Quinebaug River. The shallow pond has a watershed area of 62.6 SM, surface area of 101.7 acres, and maximum storage of 1,235 acre-feet. The dam was constructed in 1864 to provide waterpower for the United Merchants and Manufacturing Company mill and was purchased by the state in 1984. The pond was used for cooling water by Triangle Plastic Wire & Cable

Company but is not purely recreational. The mill has since burned down and the Triangle Company has closed.

According to the 1985 Phase II Engineering Report by Roald Haestad, Inc., the dam is an earthen embankment with a stone masonry overflow spillway and concrete outlet structure with stone masonry headrace. The intake structure discharges to an abandoned intake bay and a riveted iron penstock. The dam has a length of 260 feet, a height of 25 feet, and a crest width of 10 feet. The spillway has a length of 113 feet and a height of 20 feet. The intake structure is comprised of three timber gates with trash racks. The timber gate on the downstream side controls the flow to an eight-foot diameter iron penstock that discharges to the turbine. The spillway is a broad crested stone masonry weir with a length of 113 feet and located seven feet below the top of the dam. The left abutment area is lawn for two multi-family houses which are slightly protected from overflow with a small berm.

The pond has a surface area of 100 acres and a watershed of 62 SM. A DFA was completed which analyzed failure effects from a ½ PMF of 23, 241 cfs. The inundation mapping was included in the June 1979 USACE Phase I inspection. An EOP was created in April 1985 by Haestad Inc., and an Operations and Maintenance Manual was published by the CT DEEP in March 1999. Rehabilitation of the dam was completed in 1997. A General Permit for Dam Safety Repair and Alteration was issued by the CT DEEP on August 9, 2011, to address damage from the March 29-30, 2011 flood event. The storm displaced stone from the spillway. Riprap has since been added to the dam.

- Pachaug Pond Dam (No. 5805) is a Class C dam located on the Pachaug River two miles east of I-395 and 0.5 mile east of Bethel Road. Inflow to the pond is from the Pachaug River and its tributaries. According to a General Permit for Dam Safety Repair and Alteration dated August 2011, the pond has a watershed of 52.3 SM, a surface area of 831 acres, and is impounded on the west side by an earthen dam with a height of 17 feet, length of 630 feet, and a 121-foot stone masonry straight drop spillway. The 2011 permit requested permission to move displaced riprap from the March 29-30, 2010, flood, complete grading repairs to the downstream embankment, clear brush, and repair a chain-link fence. A DFA was completed by Haestad in May 1981 and an Operations and Maintenance Manual was completed in August 1982. A 1982 and 1985 EOP by Haestad are also on file with the CT DEEP, along with a 1983 Phase II Engineering Report.

This dam was recently improved.

- Hopeville Pond Dam (No. 5807) is a Class B dam located on the Pachaug River at the western end of Hopeville Pond. According to the 1985 Phase II report by Roald Haestad Inc., the dam is an earthen embankment with a centrally located concrete spillway and two outlet structures. The dam is a length of 480 feet, a height of 19 feet, a crest width which varies from 10 to 20 feet, and a spillway five feet lower than the crest elevation. The Hopeville Pond has a surface area of 122 acres, a length of 12,000 feet, a 60 SM watershed, and provides 590 acre-feet of storage. The Phase II noted that improvements should be made that would reduce the dam to a low hazard classification, specifically widening the embankments to 20 feet, installing riprap

erosion protection, and constructing a concrete training wall. The dam failure analysis indicated that there would be no loss of life and minimal property damage. The failure of the Hopeville Pond Dam could cause failure of the downstream Ashland Pond dam if the recommended improvements were not implemented. An Operations and Maintenance Manual was produced by Roald Haestad in April 1985. Based on file research, it appears that these modifications were completed in or around 1989.

- Aspinook Pond Dam (No. 5811) is a Class B dam owned by Summit Hydropower and located on the Quinebaug River, 7.8 miles upstream of the confluence with the Shetucket River and 0.9 miles upstream of the confluence with the Pachaug River. According to the 1979 USACE report, the dam is a run-of-the-river structure constructed in 1913 for manufacturing processes and electrical power for a mill south of the dam. The dam supplies cooling and fire protection water to Wyre Wynd Plant at the original mill site. The structure has a long straight overflow section 473 feet long of grouted rubble masonry with a concrete crest. A structure with firefighting pumps is located at the east side of the forebay. The dam has a height of 21.5 feet and provides a maximum storage of 7,450 acre-feet. The watershed to the pond is 668 SM.

A DFA was completed in 1979 that used a flow of 49, 500 cfs. In the 4000-foot reach downstream of the dam, significant property damage could take place if failure occurred. The industrial Wyre Wynd Company is located downstream, as well as seven homes on the left bank, one home on the right bank, and a wooden trestle bridge with a water main crossing just upstream of the Route 138/201 intersection. Minor flooding of the Penn Central Railway could occur.

Work has been done to improve the hydropower operations at this dam since the 2012 edition of this plan.

Griswold does not own any dams; however, it does have concerns about the CT DEEP-owned dams on the Pachaug River. The town feels that the CT DEEP should lower the water behind the dams each spring. Griswold has contacted the State of Connecticut about release and storage information, but the State of Connecticut has not been forthcoming with the information. In summary, the town would appreciate having a comfort level if severe rainfall occurs similar to the March 2010 flood. The Saw Mill Pond Dam, located upstream on the Pachaug River in Voluntown, is privately owned. It is essentially a run-of-the-river dam with minimal storage. This dam had some erosion of the berm in March 2010 due to overtopping.

The Saw Mill Pond Dam has an EOP on file with the CT DEEP which states that if the dam were to fail, there would be a four foot rise in downstream water levels for four hours. The Cross Road Dam downstream from the Voluntown Saw Mill Dam experienced scour in March 2010.

Coordination of releases upstream of Griswold on the Pachaug River is a concern for the town. The basin stretches into Rhode Island and many dams are present along this reach of the river. Flows can be extremely variable which can be dangerous during higher water periods.

Griswold will need to address the addition of City Pond Dam to its list of significant and high-hazard dams. Information about dam failure and an EAP should be obtained as soon as possible.

5.4.3.1 Hazard Losses

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

6. Rising Temperatures

6.1. Climate Change Impacts

On average, the annual temperature across the U.S. has increased by 1.8 degrees Fahrenheit when looking at the entire period of record (1895-2016). Accelerated warming patterns between 1979 and 2016 have been observed with satellite and surface data, and paleoclimate records show that some of the recent decades have been the warmest in the past 1,500 years.²

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, there were 45 days where over 85 degrees was 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 days over 90 degrees.

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

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

² <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 Griswold has identified the Senior Center and the Library as a cooling center in town. Because the Senior Center will be relocating, both the new and old location can serve as cooling centers; therefore, there are three potential locations in town. In the event of a projected heat event or heat wave, the Town is prepared to open up the Senior Center for cooling use.

The town has also identified the capability of providing transportation to cooling centers if needed.

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

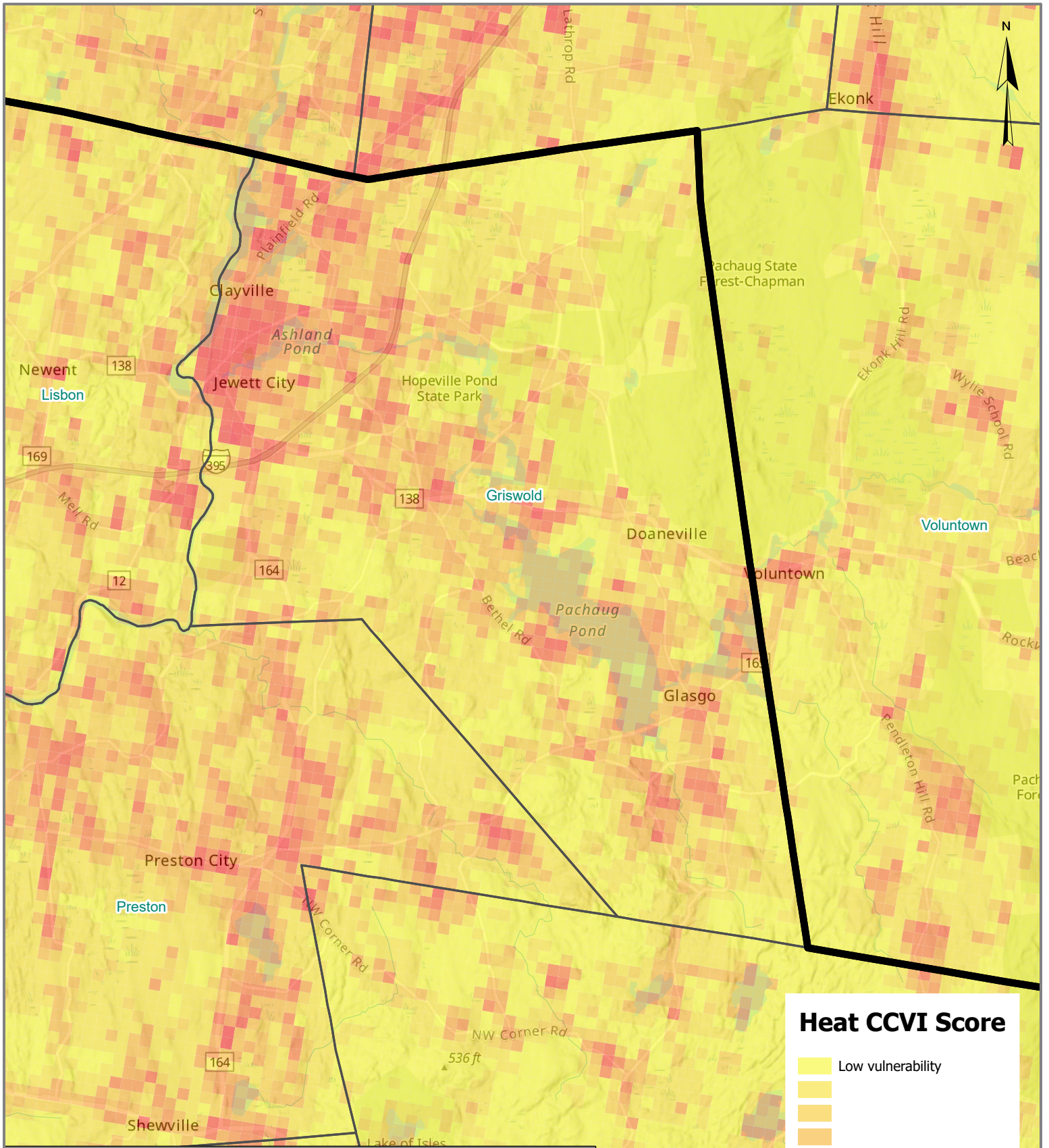
While the entire town is at risk of an extreme heat event, vulnerability can widely vary based on age, health, or the type of property owned in Griswold and Jewett City. The elderly populations in town are more vulnerable to extreme heat events, particularly when in home cooling is not available. The town is concerned about these populations in town, as well as those that are homebound. In the past the Borough purchased an air-conditioner for a homebound resident. This is not a sustainable solution for the town; however, it highlights their capabilities. Also, those with certain health conditions may also be more vulnerable to the health factors associated with extreme temperatures.

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

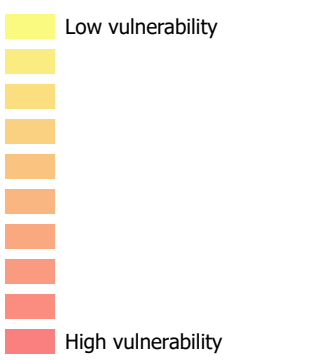
The Borough of Jewett City experiences significantly more heat exposure and sensitivity than Griswold as a whole, due to a combination of built characteristics and social vulnerabilities. An expanse of impervious surface in Pachaug leads to higher heat exposure in this location as well. Multiple facilities that could serve as cooling centers are also located in Jewett City, adding to the adaptive capacity of this area; the rest of the municipality may benefit from a more centrally located cooling center. Therefore, the overall heat vulnerability for Griswold is moderate, while for the Borough of Jewett City the overall high heat vulnerability.

6.2.3.1 Hazard Losses

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

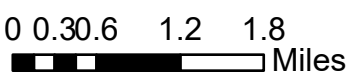


Heat CCVI Score



Heat CCVI Score

SCCOG Hazard Mitigation and Climate Adaptation Plan
 Town of Griswold and Borough of Jewett City
 12/9/2022



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

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. Griswold routinely experiences minor brush fires.

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 Griswold to monitor the drier areas of the state 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 Griswold and Jewett City Fire Departments have Mutual Aid agreements with surrounding Towns to coordinate fighting blazes larger than a single Town can manage; additionally, the CT DEEP often assists with wildland fire fighting in Griswold because of the large amounts of State land in the Town.

The public water service in the Borough and parts of Griswold is provided by Jewett City Water Company, a subsidiary of the Hazardville Water Company. The water system has 23 fire hydrants outside of the Borough. The Fire Department has an additional 14 dry hydrants throughout town and has the ability to draft water from various streams, ponds, and river. The Department has two brush trucks and a gator to access off-road fires.

Since the 2012 HMP, four new dry hydrants have been installed in areas of Griswold not served by municipal water:

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." Griswold has designated its Fire Marshal as the 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 not increased since the 2017 edition of the hazard mitigation plan was adopted.

6.3.3 Vulnerabilities and Risk Assessment

The forest areas in Griswold are the highest risk areas for fires. In many areas, structures and subdivisions are built abutting forest borders, creating areas of particular vulnerability. Wildfires are more common in rural areas than in developed areas as most fires in populated areas are quickly

noticed and contained. There have been a couple of 100-acre fires over the past 30 years. The exact dates of these fires are unknown. The town has a handful of brush fires each spring and autumn. Yet, the largest fires burn a maximum of one to two acres.

6.3.3.1 Hazard Losses

There are no reported losses for the Town of Griswold 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 Griswold. However, it is very unlikely that the town would be at the epicenter of such a damaging earthquake. No major earthquakes have affected Griswold 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 BOCA. These include the seismic coefficients for building design in Griswold. The town has adopted these codes for new construction, and they are enforced by the Town Building Official.

Due to the infrequent nature of damaging earthquakes, land use policies in Griswold do not directly address earthquake hazards.

Critical Facilities in Griswold have extra supplies in case of loss of utilities or travel capabilities. Fire Companies (which are also emergency shelters) have extra food to feed public works employees and other responders during emergency events.

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 and Borough.

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. Surficial earth materials behave differently in response to seismic activity. Unconsolidated materials such as sand and artificial fill can amplify the shaking associated with an earthquake.

Approximately 1,082 acres out of approximately 23,652 total acres or approximately 5% of the town is underlain by sand and gravel (including alluvium, sand, gravel, fines, swamp, surficial materials beneath surface water, and artificial fill). Structures in these areas are at increased risk from earthquakes due to amplification of seismic energy and/or collapse. 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 areas underlain by glacial till.

Areas of steep slopes can collapse during an earthquake, creating landslides. 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 HMP, dam failure has been addressed separately in Section 5.4.

7.2.4 Hazard Losses

There are no reported losses for the Town of Griswold 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

Griswold	Residential	Commercial	Industrial	Others	Total
	\$43,400,000	\$70,190,000	\$7,710,000	\$47,600,000	168,900,000

8. Mitigation Strategies and Actions

8.1. Status of Mitigation Strategies and Actions

A total of 22 hazard mitigation actions were developed in the previous edition of this plan. The status of each is listed below.

#	Mitigation Actions and Strategies for Griswold 2016 - 2021	Status	Status Details
1	Form a committee to review planning documents and regulations in the Planning and Community Development Office and integrate appropriate elements of this HMP into those planning documents.		Unknown; there might have been some elements integrated into most recent "Planning and Community Development plan" update (the POCD).
2	Identify locations and move forward with the pursuit of funding for the POCD's recommendation to add Fire Department substations in areas not adequately served by the existing Fire Stations.	Carry Forward	No progress. Keep this action, as ISO recommends these substations.
3	Collaborate with telecommunications companies to utilize the Norman Road Radio Tower to improve emergency communications between Town personnel.	Complete	Some other towers have been added to improve communications, including one in Voluntown near Griswold border. The Town also uses Everbridge, as noted below. This action is considered complete.
4	Coordinate with Wolverine Radio to display relevant hazard information (on a seasonal or event-specific basis) on Wolverine Radio screens located in Town Hall and other locations around Town.	Capability	This is a local radio station, and it occasionally broadcasts public service announcements. This is a capability.
5	Develop a coordinated emergency communication plan that allows the Town to broadcast alerts through Wolverine Radio, Wolverine Radio's visual displays, the parent-communication system of the public school, and the Baptist Church belltower Public Address system.	Remove/Complete	This can be retired because the action was completed in other ways. The Town and Borough use Everbridge, social media, and radio. Attendees noted that public service announcements about hazards have been distributed in the past.
6	Support the Avalonia Land Conservancy's acquisition of 74 acres of land in Griswold as part of the "Tri-Town Forest" property	Complete	This is complete.
7	Pursue HMGP funding to extend flood wall towards Wedgewood Road to prevent floodwaters from circumventing the existing wall and inundating the plant	Carry Forward with Revisions	Town was approved for a CDBG grant. Currently the DEEP Dam Safety division is reviewing plans. Approval is expected in the next few months. Revise action to "execute" this project. Prior chemical concerns have been resolved as these chemicals are no longer used.
8	Pursue funding to elevate/replace bridges which have been historically prone to scouring including Ashland Street over the Patchaug River	Remove	DEEP plans to breach the downstream dams (Slater Dam and Lower Slater Dam) once funding is acquired; once this happens the river hydraulics will change, and the scour risk may reportedly change. The Town and Borough do not know of other bridges that need to be mentioned for this action, So it can be retired.

9	Pursue funding for the acquisitions or elevations of the approximately 35 condominium units on South Main Street that were flooded during the storm of March 2010.	Carry Forward	No progress. Keep this action, as the Town and Borough generally support property protection actions when funding is available. Add a new action to also include the sewer pumping station that serves these condos, given that the pumping station has flood risk.
10	Develop formalized guidance for culvert and bridge construction and replacement that requires utilization of the most up-to-date extreme rainfall data from http://precip.eas.cornell.edu (update to Zoning Regulations Appendix 1 S:2.1)	Complete	The Town Engineer is in charge of this, and procedures are likely up to date.
11	Replace the bridge on Sheldon Road over Doaneville Pond to 1% annual-chance storm capacity	Complete	This is complete. Designed to 100-year-floodplain.
12	Replace the bridge on Norman Road over Ashland Pond to 1% annual-chance storm capacity	Complete	This is complete. Designed to 100-year-floodplain.
13	Remove the Carol Road Bridge and retire that road	Complete	Significant progress has been made and this project will be going to bid soon. The road will be turned into a cul-de-sac. The removal might happen in fall 2022 or spring 2023. Given this timing, the plan can potentially say this is complete.
14	Review flood and stream-maintenance ordinances as part of the review of Town ordinances currently underway		Attendees reported that ordinances are continuously being reviewed by a committee. They are not aware of any ordinance changes relative to floods and streams.
15	Conduct a floodplain study to determine the boundary of the floodplain adjacent to the Volunteer Fire Department Station 55; determine whether the boundary is close enough to the building to warrant construction of a flood-prevention retaining wall.	Carry Forward	The high-water mark was misstated previously, so the risk is likely less than previously believed. Carry this forward, as this needs follow-up.
16	Add tree maintenance and trimming language into regulations wherever possible.	Capability	The tree maintenance budget has been increased from \$5,000 to \$25,000. No need to change the regulations. The action can be retired.
17	Provide information for generally protecting residents during cold weather and for mitigating icing and insulating pipes at town residences.	Capability	This is done through Public Health and Safety Committee and the Fire Marshal. Ongoing. Remove the action because this is a capability.
18	Breach and remove the Route 138 / Slater Avenue Dam on the Quinebaug River	See #8	See Action #8. Note that this is the Pachaug River, and not the Quinebaug River.
19	Breach and remove the dam just downstream on the Quinebaug River	See #8	See Action #8. Note that this is the Pachaug River, and not the Quinebaug River.
20	Request that CT DEEP take over control of and responsibility for the Carroll Row Dam	Remove	This may be the bridge structure that will be removed by town (action #13), which will hopefully reduce the associated flood risk. DEEP is reportedly unlikely to take over.

21	Remove the Rubber Pond Dams	Carry Forward	Keep this action. This dam reportedly leads into a culvert that flows under a road and goes into a pond upstream of the Carroll Row Dam. There has been considerable settlement that the Dam Division has been investigating.
22	Griswold will need to address the addition of City Pond Dam to its list of significant and high-hazard dams. Information about dam failure and an EAP should be obtained as soon as possible.	See #8	Town staff are not familiar with this dam; this action needs follow-up. If this is referring to the Patchaug Pond Dam, it is owned by the state and currently undergoing work. (Further follow-up suggests that this is the Slater Dam referenced in action #8).

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 Griswold and Jewett City to undertake from 2023 through 2028 are listed in Table 8-1 and Table 8-2 on the following pages. 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:

- Conduct a feasibility study for addressing septic system challenges in the Lake Road area, either through sewer extension, septic system relocations, or installation of a community subsurface sewage disposal system.
- Pursue funding for floodproofing the sewer pumping station that serves the condominiums on South Main Street given that this station has a high flood risk.
- Construct flood wall extension towards Wedgewood Road to prevent floodwaters from circumventing the existing wall and inundating the plant.

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

- Ensure that the new senior center and old senior center building are fitted with appropriate amenities and access to be used as cooling centers; and secure reliable transportation options for people to access cooling centers.

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

Table 8-1 Town of Griswold 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 =
GR1	Identify locations and move forward with the pursuit of funding for the POCD's recommendation to add Fire Department substations in areas not adequately served by the existing Fire Stations.	Ensure that critical facilities are resilient, with special attention to shelters and cooling centers.	Preparedness & Emergency Response	Office of the Chief Elected Official	>\$1M	FEMA HMA; Other preparedness grants; STEAP	7/2023 - 6/2025	Medium	14	1	14
GR2	Ensure that the new senior center and old senior center building are fitted with appropriate amenities and access to be used as cooling centers; and secure reliable transportation options for people to access cooling centers.	Ensure that critical facilities are resilient, with special attention to shelters and cooling centers.	Preparedness & Emergency Response	Office of the Chief Elected Official	\$100,000 - \$500,000	FEMA HMA; Other preparedness grants; STEAP	7/2023 - 6/2025	High	16	6	96
GR3	Conduct a floodplain study to determine the boundary of the floodplain adjacent to the Volunteer Fire Department Station 55; determine whether the boundary is close enough to the building to warrant construction of a flood-prevention retaining wall.	Reduce flood and erosion risks by reducing vulnerabilities and consequences, even as climate change increases frequency and severity of floods.	Structural Projects	Public Works	\$10,000 - \$25,000	FEMA HMA Scoping Study	7/2025 - 6/2026	Medium	16	5	80
GR4	Remove the Rubber Pond Dams	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	NOAA/NFWF; DEEP; IJJA RFPBR	7/2026 - 6/2027	Low	21	4	84
GR5	Support property acquisitions in the Town as needed (for example, Mill Road) when funding allows.	Reduce flood and erosion risks by reducing vulnerabilities and consequences, even as climate change increases	Natural Resources Protection	Office of the Chief Elected Official	>\$1M	FEMA HMA	7/2024 - 6/2027	Medium	16	6	96

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 =
		frequency and severity of floods.									
GR6	Conduct a feasibility study for addressing septic system challenges in the Lake Road area, either through sewer extension, septic system relocations, or installation of a community subsurface sewage disposal system.	Reduce losses from other hazards that are affected by climate change.	Water & Wastewater Utility Projects	Public Works	\$50,000 - \$100,000	CWSRF; EPA 319; STEAP	7/2025 - 6/2026	Medium	17	7	119
GR7	Require floodplain manager and land use staff to take free training at https://portal.ct.gov/DEEP/P2/Chemical-Management-and-Climate-Resilience/Chemical-Management-and-Climate-Resilience to reduce risks of spills from businesses during floods.	Reduce flood and erosion risks by reducing vulnerabilities and consequences, even as climate change increases frequency and severity of floods.	Education & Awareness	Land Use Staff	\$0 - \$10,000	Municipal Operating Budget	7/2023 - 12/2023	Low	14	6	84

Table 8-2 Borough of Jewett City 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 =
JC1	Construct flood wall extension towards Wedgewood Road to prevent floodwaters from circumventing the existing wall and inundating the plant	Reduce flood and erosion risks by reducing vulnerabilities and consequences, even as climate change increases frequency and severity of floods.	Structural Projects	Borough Public Utilities and Town Public Works	\$500,000 - \$1M	FEMA HMA	7/2025 - 6/2026	Medium	17	8	136

Number	Hazard Mitigation and Climate Adaptation Actions	Hazard Mitigation and Climate Adaptation Goal	Type of Action	Responsible Department	Approx. Cost Range	Potential Funding Sources	Timeframe	Priority	PERISTS Score	STAPLEE Score	PERSISTS x STAPLEE =
JC2	Pursue funding for the acquisitions or elevations of the approximately 35 condominium units on South Main Street that were flooded during the storm of March 2010.	Reduce flood and erosion risks by reducing vulnerabilities and consequences, even as climate change increases frequency and severity of floods.	Property Protection	Office of the Borough Warden	>\$1M	FEMA HMA	7/2024 - 6/2026	Medium	16	8	128
JC3	Pursue funding for floodproofing the sewer pumping station that serves the condominiums on South Main Street given that this station has a high flood risk.	Reduce flood and erosion risks by reducing vulnerabilities and consequences, even as climate change increases frequency and severity of floods.	Water & Wastewater Utility Projects	Borough Public Utilities and Town Public Works	\$100,000 - \$500,000	FEMA HMA; CWSRA; STEAP	7/2025 - 6/2026	Medium	19	8	152
JC4	Support property acquisitions in the Borough as needed when funding allows.	Reduce flood and erosion risks by reducing vulnerabilities and consequences, even as climate change increases frequency and severity of floods.	Natural Resources Protection	Office of the Borough Warden	>\$1M	FEMA HMA	7/2024 - 6/2027	Medium	16	6	96