

HAZARD MITIGATION PLAN UPDATE ANNEX FOR THE TOWN OF GRISWOLD

**Southeastern Connecticut Council of Governments
Multi-Jurisdictional Hazard Mitigation Plan Update**

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TABLE OF CONTENTS

<u>Section</u>	<u>Page</u>
1.0 INTRODUCTION	
1.1 Purpose of Annex.....	1-1
1.2 Setting	1-1
1.3 Plan Development.....	1-1
1.4 Progress Monitoring	1-2
2.0 COMMUNITY PROFILE	
2.1 Physical Setting.....	2-1
2.2 Land Use and Development Trends.....	2-2
2.3 Drainage Basins and Hydrology	2-4
2.4 Governmental Structure	2-4
2.5 Review of Existing Plans and Regulations	2-8
2.6 Critical Facilities, Sheltering Capacity, and Evacuation.....	2-9
2.7 Status of 2005 Plan Recommendations.....	2-12
3.0 INLAND FLOODING	
3.1 Setting / Historic Record.....	3-1
3.2 Existing Programs, Policies, and Mitigation Measures	3-1
3.3 Existing Programs, Policies, and Mitigation Measures	3-2
3.3.1 Vulnerability Analysis of Areas Along Watercourses.....	3-2
3.3.2 Vulnerability Analysis of Private Properties.....	3-5
3.3.3 Vulnerability Analysis of Critical Facilities.....	3-6
3.4 Potential Mitigation Measures, Strategies, and Alternatives	3-7
4.0 COASTAL FLOODING & STORM SURGE	
4.1 Setting / Historic Record.....	4-1
4.2 Existing Programs, Policies, and Mitigation Measures	4-1
4.3 Vulnerabilities and Risk Assessment.....	4-1
4.4 Potential Mitigation Measures, Strategies, and Alternatives	4-1
5.0 HURRICANES AND TROPICAL STORMS	
5.1 Setting / Historic Record.....	5-1
5.2 Existing Programs, Policies, and Mitigation Measures	5-1
5.2 Vulnerabilities and Risk Assessment.....	5-2
5.4 Potential Mitigation Measures, Strategies, and Alternatives	5-3

TABLE OF CONTENTS (Continued)

6.0	SUMMER STORMS AND TORNADOES	
6.1	Setting	6-1
6.2	Vulnerabilities and Risk Assessment	6-1
6.3	Existing Programs, Policies, and Mitigation Measures	6-1
6.4	Potential Mitigation Measures, Strategies, and Alternatives	6-2
7.0	WINTER STORMS AND NOR'EASTERS	
7.1	Setting	7-1
7.2	Vulnerabilities and Risk Assessment	7-1
7.3	Existing Programs, Policies, and Mitigation Measures	7-2
7.4	Potential Mitigation Measures, Strategies, and Alternatives	7-2
8.0	EARTHQUAKES	
8.1	Setting	8-1
8.2	Vulnerabilities and Risk Assessment	8-1
8.3	Existing Programs, Policies, and Mitigation Measures	8-1
8.4	Potential Mitigation Measures, Strategies, and Alternatives	8-2
9.0	WILDFIRES	
9.1	Setting	9-1
9.2	Vulnerabilities and Risk Assessment	9-1
9.3	Existing Programs, Policies, and Mitigation Measures	9-1
9.4	Potential Mitigation Measures, Strategies, and Alternatives	9-1
10.0	DAM FAILURE	
10.1	Setting	10-1
10.2	Vulnerabilities and Risk Assessment	10-1
10.3	Existing Programs, Policies, and Mitigation Measures	10-3
10.4	Potential Mitigation Measures, Strategies, and Alternatives	10-6

TABLE OF CONTENTS (Continued)

11.0 RECOMMENDATIONS

11.1 Summary of Specific Recommendations 11-1

 11.1.1 Recommendations Applicable to All Hazards 11-1

 11.1.2 Recommendations Applicable to Inland and Coastal Flooding 11-3

 11.1.3 Recommendations Applicable to Wind Damage from Hurricanes, Tropical Storms,
 Tornadoes, and Winter Storms 11-4

 11.1.4 Recommendations Applicable to Earthquakes 11-5

 11.1.5 Recommendations Applicable to Wildfires 11-5

 11.1.6 Recommendations Applicable to Dam Failure 11-6

11.2 Prioritization of Specific Recommendations 11-6

Tables

Table 2-1 Critical Facilities 2-10

Table 10-1 Dams Registered With the DEEP in the Town of Griswold 10-3

Table 11-1 Town of Griswold STAPLEE Matrix for Prioritizing Recommendations 11-7

Figures

Figure 3-1 FEMA Special Flood Hazard Areas 3-4

Figure 10-1 Dam Failure Inundation Area Mapping 10-2

Appendices

Appendix A – Record of Local Adoption

1.0 INTRODUCTION

1.1 Purpose of Annex

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 to the Town of Griswold. Background information and the regional effects of pertinent natural hazards are discussed in the main body of the Southeastern Connecticut Council of Governments (SCCOG) Multi-Jurisdictional Hazard Mitigation Plan. Thus, this annex is designed to supplement the information presented in the Multi-Jurisdictional HMP with more specific detail for Griswold and is not to be considered a standalone document.

The primary goal of this hazard mitigation plan annex is to identify particular vulnerability to natural 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 includes the reduction of public and private damage costs. Limiting losses of and damage to life and property will also reduce the social, emotional, and economic disruption associated with a natural disaster.

1.2 Setting

The Town of Griswold is a rural community which is located approximate 4.5 miles to the east-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 11,951 as of the 2010 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)

1.3 Plan Development

The 2005 HMP and its annexes were developed through a series of meetings and the completion of written questionnaires, personal interviews, and workshops as described in the Multi-Jurisdictional HMP update. Since that time, the HMP has been available in local governmental offices and available to emergency personnel. Residents were encouraged to contact the

Emergency Management Director with any concerns regarding emergency response or potential projects related to natural hazard damage.

Based on the existing plan, existing information, and hazards that have occurred since 2005, SCCOG determined that the following data collection program would be sufficient to collect data to update the Multi-Jurisdictional plan and each annex.

- ❑ The SCCOG issued a press release on November 20, 2011 announcing a public information meeting on the multi-jurisdictional HMP update. This press release was published in the *Norwich Bulletin* and *The Day*. This notice was also posted on the SCCOG website and the *Groton Patch* (a popular internet newspaper). The public information meeting was held on December 13, 2011 at the SCCOG office.
- ❑ A data collection meeting was held with the on February 1, 2012 to discuss the scope and process for updating the plan and to collect information. The Town Planner coordinated the local planning team which included the Fire Chief/Road Superintendent and the Emergency Management Director. The meeting focused on reviewing each section of the existing hazard mitigation plan and annex, critical facilities, and various types of hazards that have affected the town and that should be addressed in the update.
- ❑ The draft that is sent for State review will be posted on the City website (<http://www.griswold-ct.org/>) as well as the SCCOG website (<http://www.seccog.org>) for public review and comment. In addition, a hard copy will be made available in the SCCOG office in Norwich. A press release will announce the availability of the HMP for review. This will provide residents, business owners, and other stakeholders throughout the SCCOG region the opportunity to review and comment on a relatively complete draft with all annexes. Comments received from the public will be incorporated into the final draft where applicable following State and Federal comments.

The adoption of this HMP update by the Town of Griswold will be coordinated by SCCOG and the Planning and Community Development Office. The HMP update must be adopted within one year of conditional approval by FEMA, or Griswold will need to update the HMP and resubmit it to FEMA for review. The adoption resolution is located in Appendix A of this annex.

1.4 **Progress Monitoring**

Following adoption, the Planning and Community Development Office will administer the HMP under the authority of the Board of Selectmen and the Town Planner will be the local coordinator of the HMP. The Planning and Community Development Office will coordinate with responsible departments as listed in Table 11-1 and ensure that the recommendations of this HMP are considered or enacted. Refer to Section 1.8 of the Multi-Jurisdictional HMP for a description of how the local coordinator will perform progress monitoring. The majority of recommendations in this annex can be accomplished within or with only a slight increase in the operating budgets of the various departments. Projects that require capital improvements or additional funding will need to be approved by the Board of Selectmen.

The HMP will be on file in the Town Planner and at the Planning and Community Development Office to assist in guiding growth decisions. See Section 2.5 for recommendations related to integrating the findings of this HMP into other town planning documents. Griswold will

encourage residents to contact the Planning and Community Development Office with concerns related to natural hazards or emergency response via the town's website. Such announcements will also state that the HMP is available for public review at the Planning and Community Development Office as well as being posted on the town and SCCOG websites.

Griswold will review the status of plan recommendations each year. The Planning and Community Development Office will be in charge of overseeing recommended projects and coordinating an annual meeting with applicable departments (those listed in Table 11-1) and other interested departments. Refer to Section 1.8 of the Multi-Jurisdictional HMP for a list of matters to be discussed at the annual meeting, including a review of each recommendation and progress achieved to date, or reasons for why the recommendation has not been enacted. The Planning and Community Development Office will keep a written record of meeting minutes and the status of the recommendations. These records of progress monitoring will form the basis for the next HMP update.

Griswold understands that the multi-jurisdictional HMP and this annex will be effective for five years from the date of FEMA approval of the first SCCOG jurisdiction regardless of the date of adoption by the town. The Planning and Community Development Office will coordinate with SCCOG for the next HMP update which is expected to occur in 2016-2017.

2.0 COMMUNITY PROFILE

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.

2.2 Land Use and Development Trends

Approximately 74% of land in the Town of Griswold is not developed according to the 2006 *Plan of Conservation and Development* (POCD) (effective July 2007). According to the document, as of 2005, the total amount of developed land was approximately 5,857 acres, while the amount of undeveloped land was approximately 8,900 acres. The document defined "undeveloped" land as open space, reservoir and water supply, recreation, current agriculture, dedicated agriculture, and undeveloped. Not all undeveloped land is necessarily developable, however. Some land is owned by the Jewett City Water Company to protect their watershed from pollution, while other land is set aside for agriculture development. In addition, some forest properties are undevelopable due to steep slopes while others do not allow development due to their proximity to wetlands.

According to the POCD, 18% of the developed area of town is residential medium and high-density units, 54% are residential low-density units, 15% are transportation and utilities structures, while the remaining 13% is a combination of three uses including institutional, commercial, and industrial.

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 area of Griswold is the area surrounding Glasgo and Doaneville Ponds along the Griswold-Voluntown town line. In this area, land uses include industrial, commercial and some high density residential. 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 "undeveloped" and "open space". As explained in the current POCD, a 1993 POCD study found that land with no development constraints was scattered throughout town. Since then, some parcels are now being utilized for agricultural purposes.

The current POCD states that Griswold is actively seeking to attract economic development. In June of 2005, the Department of Planning and Community Development conducted a simple telephone survey of municipalities along and around the I-395 corridor and inquired which towns had staff dedicated solely to the promotion of economic development and which towns had designated Industrial/Business Parks. Griswold found that all the towns to the north (Plainfield, Sterling, Killingly, Putnam, and Thompson) employed a full-time Economic Development professional and all but Thompson had at least one Industrial/Business Park. Conversely, to the south of Griswold (Lisbon, Norwich, Montville, and Waterford), the town found that only Norwich employed an Economic Development professional and only Norwich and Montville had at least one Industrial/Business Park. Towards this end, Griswold created the Business Park zoning classification and has made it a priority of the town to locate a business or series of businesses which would develop at the business park.

The 2000 census population of the town was 10,807. Despite adding approximately 1,144 people through 2010, there have been no major changes in development since the last HMP in 2005. Residential development has been nearly stagnant over the past five years. There are 150 approved residential homes which remain unbuilt and the developers are withdrawing their approved subdivision applications. Commercial development, conversely, has been slow but steady with a series of small projects including a new proposed commercial subdivision which is proposed on Route 138. In regards to industrial land use, facilities such as the Wyre Wynd factory which produced specialty wire, have been closing. A hotel project near I-395 was also approved but never built. The largest development in town over the past five years has been municipal in land use as the elementary school was developed.

Demographic trends for the Town are similar to many other communities in Connecticut and are closely tied to the state's economy. According to Census 2010, approximately 22.9% of the population of Griswold was under 18 years of age, 66.5% was between the ages of 18 and 64, and 10.7% was 65 years and older. According to the University of Connecticut, Connecticut State Data Center (UCCSDC), the projected town population in 2030 is 13,413.

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.

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.

2.3 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 Kinny 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 Glasgow 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.

2.4 Governmental Structure

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 takes 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 is 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 Griswold Community Ambulance, a private contractor founded by American Legion Post No. 15. They are currently located near the Town Hall but are moving to a new facility on Route 138. The agency has implemented Telehealth monitoring to provide daily monitoring of patients from their homes.

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).

Public Health and Safety Committee

The Public Health and Safety Committee is comprised of nine members and administers the town regulations pertinent to the health and safety of town residents and business people. In the event of a natural disaster, their direction when making decisions in this regard becomes a necessity.

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 & 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.

2.5 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 (2007)

The Plan of Conservation and Development (POCD) was made effective on July 30, 2007 with contributions from local boards and commissions, citizens, and citizen groups. The purpose of

the POCD is to balance growth with maintaining the quality of life that citizens within the town embrace. The POCD does not directly address pre-disaster mitigation or natural hazards; however it does provide strategies for addressing development in floodplains, near steep slopes, and near wetland areas. Griswold is currently updating the POCD. Information in the draft HMP update will be incorporated into the POCD update, a process that will likely be finished before the HMP update is approved.

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.

Regulations and Ordinances

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 and the Borough use the same Subdivision Regulations. 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. 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.

2.6 Critical Facilities, Sheltering Capacity, and Evacuation

The Town of Griswold considers that several categories of facilities are critical for these are needed to ensure that emergencies are addressed while day-to-day management of the community continues. The two Fire Departments, Town Hall, Public Works Garage, Senior Center, its four schools, and Waste Water 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 2-1
Critical Facilities**

Facility	Address or Location	Emergency Power Supply?	Shelter?	In Floodplain?
<i>Emergency Services</i>				
Griswold Volunteer Fire Co.	883 Voluntown Road	Yes	Yes	No
A.A. Young Jr. Hose & Ladder Co. #1	105 Hill St, Jewett City	Yes	Yes	No
Griswold Visiting Nurses Assoc.	68 Ashland St, Jewett City	No	No	Yes
Griswold Community Ambulance	28 Main Street	No	No	No
<i>Municipal Facilities</i>				
Town Hall	28 Main Street	No	No	No
Public Works Garage	1148 Voluntown Rd (Rte.138)	No	No	No
Senior Center	28 Main Street	No	Yes	No
Griswold Elementary School	303 Slater Ave, Jewett City	Yes	Yes	No
Griswold Middle School	211 Slater Avenue	No	No	No
Griswold High School	267 Slater Avenue	No	No	No
<i>Health Care / Senior Living</i>				
Ashland Manor (Housing Authority)	Ashland Street	No	No	No
McCluggage Manor (Housing Auth.)	Taylor Hill Road	No	No	No
Ledgewood Apartments	Pleasant View Drive	No	No	No
United Community & Family Services	76 Main Street	No	No	No
<i>Other Infrastructure / Facilities</i>				
Wastewater Treatment Plant	Wedgewood Drive	No	No	Yes
Little Log School House (daycare)	242 Bitgood Rd, Jewett City	No	No	No
Headstart (daycare)	129 E. Main St, Jewett City	No	No	No

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, the Griswold Senior Center, and the Griswold Community Ambulance.

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 POCD notes that the Department of Fire and Rescue recommend construction of two new sub-stations 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. During Tropical Storm Irene, the Senior Center was used primarily for logistics (sorting food deliveries to seniors, etc.). The ARC plans to evaluate the Senior Center to determine shelter requirements in the near future.

Evacuation Routes

Griswold does not have a published evacuation map, but rather utilizes state roads or local roads to exit the town. The SCCOG Long Range Regional Transportation Plan (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.

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.

2.7 Status of 2005 Plan Recommendations

The previous HMP included several general recommendations related to mitigating natural hazards. The recommendations and a summary of actions taken over the past several years towards those actions are listed below. Where progress was indicated, the progress was paid for out of the City's operating budget.

- ❑ Relocation of Griswold Volunteer Fire Department Containing Emergency Operation Center or Improve Hydraulics of Route 138 Bridge at Pachaug River – The Route 138 Bridge is a CT DOT bridge and is not slated for repair or replacement. The Fire Chief/Road Planner has a proposal to move the Fire Department east on Route 138 to be near the Public Works Garage, but Griswold does not have the funds to build a new facility. The Volunteer Fire Department building did not flood during the rain events of March 2010, which is considered to be the most recent flood of record for southeastern Connecticut. As the facility does not appear to be in the floodplain on the 2011 DFIRM, this recommendation may no longer be necessary.
- ❑ Enhance Emergency Power Generation Capability at Critical Facilities – The Griswold Volunteer Fire Department installed a new generator in July 2011 with a 1,000 gallon propane tank capable of running for 800 consecutive hours without refueling. Other facilities will be upgraded as the budget allows.
- ❑ Evaluate Feasibility of Intercommunity Emergency Response and Sheltering at Griswold High School – The Fire Chief/Road Planner has evaluated this recommendation. Griswold has mutual aid agreements with surrounding towns and the towns will typically send additional shelter visitors to regionally located mass shelter facilities run by the ARC when their shelters are full. If needed and if Griswold were to have space, the town could potentially take some shelter visitors from neighboring towns as well. However, no formal agreement is in place. Sheltering at Griswold High School has been discussed with the school district and they are concerned about the inability to compartmentalize the school during an emergency. This inability brings about costly heating and sanitation concerns. Therefore, sheltering at the High School is considered to be an emergency option after all other shelter scenarios are exhausted.
- ❑ Evaluate the Hazard Resistant Nature of Critical Facilities – This is ongoing as part of the Griswold's annual EOP update. No critical facilities are believed to be more or less susceptible to natural hazards, aside from the Jewett City WPCF which is in the SFHA floodplain, Zone AE of the Quinebaug River.
- ❑ Comprehensive Evaluation of Emergency Communication Capabilities Throughout the Nation – This is ongoing along with the annual EOP update. Griswold has improved its interdepartmental communication capability and also has communication capability with the State of Connecticut and surrounding communities.
- ❑ Evaluate Structural Projects and Property Acquisition for Floodprone Homes on Arbor Road – The original recommendation regarded being able to access elderly persons in the area. There is one home off Arbor Road that appears to be in the SFHA floodplain of the Quinebaug River, and another whose driveway crosses the SFHA floodplain. Both homes are accessed by long dirt driveways. This area was not flooded during the rain events of March 2010, and Griswold is not currently proposing mitigation projects in this area.

- ❑ Review of Transportation Facilities to Identify Critical Risks – This is ongoing annually as part of the EOP update. Griswold experienced access problems after Tropical Storm Irene due to the many downed trees and power lines.
- ❑ Identify Appropriate Improvements to Traffic Infrastructure and Emergency Response Training and Equipment – This is ongoing as part of weekly Fire Department training and the annual EOP update. Griswold has access to CERRIT, the regional hazardous materials response team.
- ❑ Implement a Reverse 9-1-1 System to Automatically Call Telephones Throughout Town, Relaying Important Information During an Emergency – The town is not part of the statewide CT Alerts "Everbridge System" due to the cost of the system. However, Griswold's school system has a reverse call program that can be used to notify parents during an emergency.
- ❑ Distribute or Post Public Information Regarding Hazards in the Town – Notifications are posted on bulletin boards around town, at municipal buildings, and on the Griswold website. Local media is utilized to pass information during storms, including newspaper, television, and radio. Prior to Tropical Storm Irene, information was passed out at the Fire Departments, library, and businesses. Town staff also performed well-being checks on elderly and disabled residents who are known to have issues during the outages. An information kiosk is proposed for outside of the Town Hall.
- ❑ Evaluate Emergency Shelters, Update Supplies, and Check Communication Equipment – This is done at least quarterly or following use of any of the facilities.
- ❑ Maintain Emergency Personnel Training as Well as Maintaining and Updating Emergency Equipment and Response Protocols – Training is performed regularly, with equipment upgrades occurring to the extent the budget will allow.
- ❑ Evaluate and Consider Burying Power Lines Underground and Away from Possible Tree Damage – This is only considered for new projects. There are no plans to move existing utilities underground.
- ❑ Complete an Earthquake Survey of all Critical Facilities and Infrastructures –A formal survey is not proposed due to the infrequent nature of this hazard.
- ❑ Complete Catch Basin and Culvert Surveys to Identify Structures in Need of Maintenance or Replacement – Inspections are performed annually each spring by the Public Works Department during cleaning operations. Griswold has excellent mapping of all its drainage systems as a product of its MS4 requirements. The Public Works Department also inspects catch basins in floodprone areas for blockages prior to major storms, especially the ones along Geer Road, Lynn Drive, and Ashland Street.
- ❑ Complete a Survey of Fire Hydrants to Assess Vulnerabilities and Capabilities for Fire Protection – Fire protection capabilities are reviewed at least annually with the EOP update. Fire flow pressures are believed poor in some sections of the Borough of Jewett City but the water company has yet to release the fire flow data. Griswold believes that its fire protection level is adequate. The town is proposing to install additional dry hydrants as funding allows. In addition, all new town and state bridge projects will include dry hydrant installation. The dry hydrants in Griswold have an annual maintenance schedule and are all in good condition.

3.0 INLAND FLOODING

3.1 Setting / Historical Record

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.

- ❑ Many Griswold roadways were flooded during the March 2010 rain events. This storm is considered a new flood of record for southeastern Connecticut. 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.

3.2 Existing Programs, Policies, and Mitigation Measures

The town has in place a number of measures to mitigate for 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 floodprone areas, replacing bridges, promoting flood insurance, acquiring floodprone structures, maintaining drainage systems, through 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 2.5 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. Recent and ongoing flood mitigation is described below.

The bridge on the Bitgood Road over the Pachaug River was recently raised three feet providing additional conveyance. Additionally, the town has 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 Doanville Brook, Norman Road over the Pachaug River, and Ashland Street over the Pachaug River.

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 3.3.1) and either the acquisition of a floodprone property on Popple Bridge Road or a drainage upgrade to the road.

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.

3.3 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.

According to the 2010 FEMA FIRM GIS data layers, a total of 2,643 acres of land in Griswold is located within the SFHA, and a total of 3,253 acres of land is located within the 500-year flood boundary (which includes the areas within the SFHA boundary).

3.3.1 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 3-1 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.

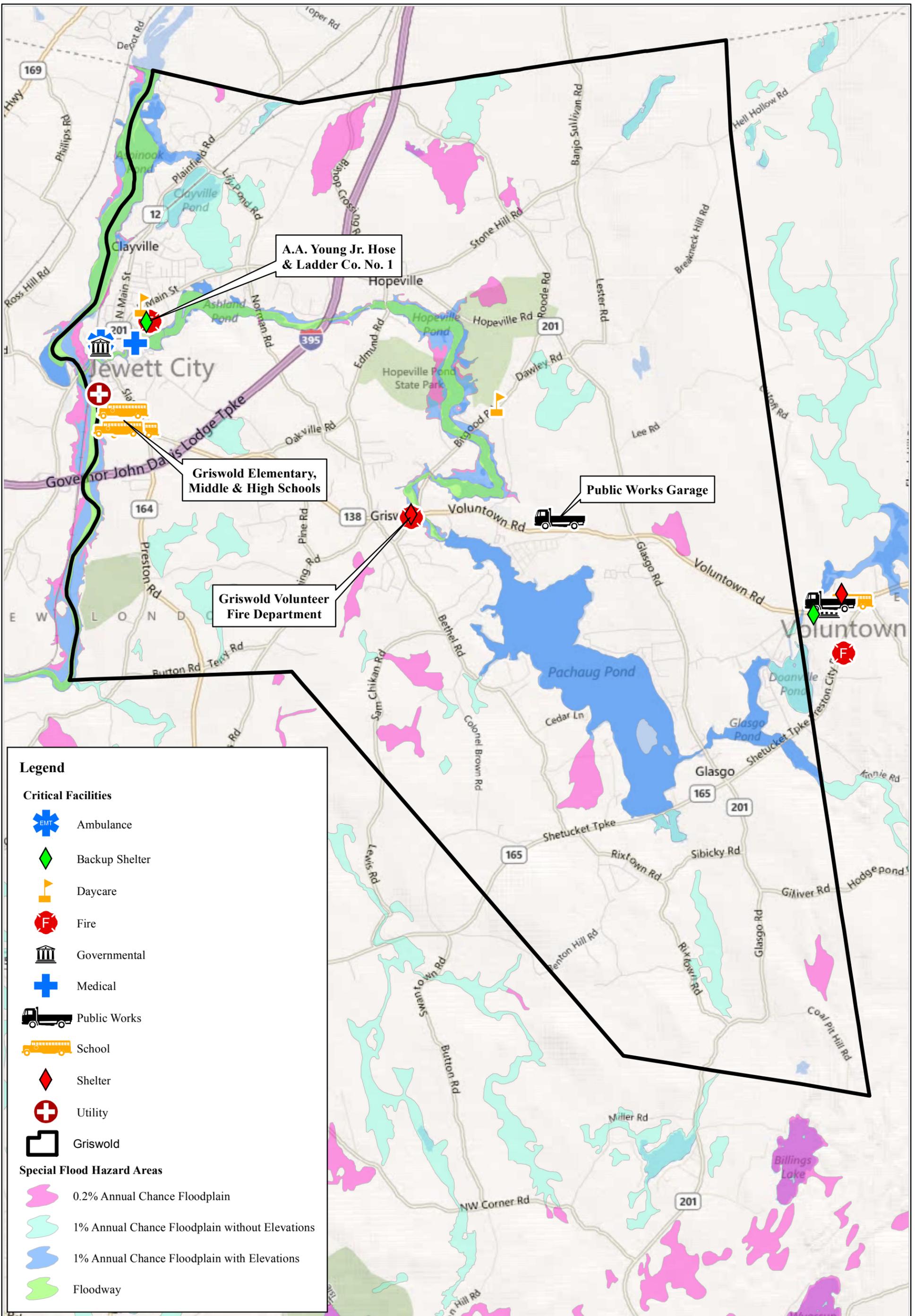
There are several roads throughout Griswold which have the potential to flood. These roads include Bitgood Road, Route 138, Old Bethel Road, Norman Road, and Edmund Road along the Pachaug River. Route 138 was inundated with three to four feet of water during the floods of March 2010. As a result, the 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.

The culvert at the intersection of Carol Road and Sheldon Road has difficulty conveying water. Backwater conditions in Mill Pond (a small impoundment of the Patchaug River upstream of Carol Road) causes 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 reroute the Sheldon Road culvert downstream below the private dam to alleviate the backwater flooding. The bridge on Carol Road will be closed in the fall of 2012 for removal. Should funding not be available, the town would need to close the road at the dam altogether. This would force the town to create an unfavorable detour diminishing traffic flow quality in a high volume traffic area.

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 Doanville Pond, an impoundment of the Patchaug 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.



SOURCE(S):
 Base Map:
 "Bing Maps Road" Datalayer
 (c) 2010 Microsoft Corporation and its data suppliers
 "Critical Facilities" Datalayer
 Town of Franklin, 2012
 Special Flood Hazard Areas
 FEMA, 2011

Figure 3-1: FEMA Special Flood Hazard Areas

SCCOG HMP Update
Town of Griswold Annex

Map By: SMG
 MMI#: 3570-05
 MXD: H:\3570-05\GIS\Maps\Griswold\Figure3-1.mxd
 1st Version: 06/27/2012
 Revision: 6/29/2012
 Scale: 1 in = 3,750 ft

Location:
Griswold, Connecticut

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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 considering this property to be a potential acquisition project. There is a Zone A floodplain in the area from Doanville 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. Griswold has tentative approval from the State of Connecticut and FEMA to receive grant funding under the HMGP to construct a floodwall around the facility pending completion of this HMP update.

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. Failing that, the town would like to determine some method of directing flow away from the structure, a process which may require drainage easements from neighboring property owners.

3.3.2 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 software platform *ArcGIS* was utilized along with 2008-2009 aerial photography to determine the number of properties located within the various SFHAs within Griswold as discussed above. There are approximately nine structures with at least a portion of the structure located within the mapped SFHA floodplain of the Quinebaug River and 25 structures within the 0.2 percent annual chance floodplain of the Quinebaug River. Approximately 10 structures are located within the mapped SFHA floodplain of the Pachaug River, with an additional six structures in the 500-year floodplain. The majority of structures in a mapped floodplain are located adjacent to the Hopeville and Pachaug Ponds on the Pachaug River. Approximately 67 structures are located in the SFHA floodplain, with an additional 14 in the 0.2 percent annual chance floodplain.

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 Patchaug 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 floods of March 2010. The water infiltrated through the retaining wall and flooded the basement. The Fire Department needed 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 initial application was ranked low. Griswold would like to purchase the property and turn it into a retention area. If that option is not available, then the town wishes to identify some a method or methods to direct flow away from the structure. Such solution may require drainage easements from neighboring property owners.

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.

3.3.3 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 wishes to add a retaining wall at Station 55.

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 has tentative approval from the State to receive grant funding under the HMGP to construct a floodwall around the facility pending completion of the subject update.

3.4 Potential Mitigation Measures, Strategies, and Alternatives

A number of measures can be taken to reduce the impact of a flood event. These include measures that prevent increases in flood losses by managing new development, measures that reduce the exposure of existing development to flood risk, and measures to preserve and restore natural resources. These are listed in Section 11 under the categories of prevention, property protection, structural projects, public education and awareness, natural resource protection, and emergency services.

4.0 COASTAL FLOODING & STORM SURGE

4.1 Setting / Historic Record

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 Existing Programs, Policies, and Mitigation Measures

Griswold does not have any regulations in affect to restrict development due to coastal flooding hazards.

4.3 Vulnerabilities and Risk Assessment

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

4.4 Potential Mitigation Measures, Strategies, and Alternatives

No mitigation measures for reducing the impact of coastal flooding or storm surge are necessary or are proposed within Griswold.

5.0 HURRICANES AND TROPICAL STORMS

5.1 Setting / Historic Record

Several types of hazards may be associated with tropical storms and hurricanes including heavy or tornado 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.

The last major hurricane or tropical storm wind event to affect Griswold was in the form of Tropical Storm Irene 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. While CL&P installed a peak demand generator in the Borough of Jewett City prior to Tropical Storm Irene and designed to minimize brownouts, CL&P did not activate it throughout the storm. Although town officials are not certain of this reason for this, they believe that the reason CL&P did not activate the system was because it was not fully understood, coupled with the fact that the system could not provide consistent power to the entire Borough if operated.

5.2 Existing Programs, Policies, and Mitigation Measures

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.

Wind loading requirements are addressed through the state building code. The 2005 Connecticut State Building Code was amended in 2009 and adopted with an effective date of August 1, 2009. The code specifies the design wind speed for construction in all the Connecticut municipalities. Effective December 31, 2005, the design wind speed for Griswold is 110 miles per hour. 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.

Parts of trees (limbs) or entire tall and older trees may fall during heavy wind events, potentially damaging structures, utility lines, and vehicles. The CL&P Company, the local electric utility, provides tree maintenance near its power lines. No other utilities are believed to perform tree trimming in Griswold. The town has a Tree Warden which works off the Public Works' budget that includes \$5,000 per year for tree maintenance. The Public Works staff trims smaller trees, while jobs involving larger trees and those near power lines have historically been contracted out.

In addition, 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 needed 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.

Direct Wind Damage to Structures

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, Glasgow 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.

5.3 Vulnerabilities and Risk Assessment

As noted in Section 5 of the main plan, the region has experienced a number of significant storms in recorded history. The most recent storms include Tropical Storm Irene and Winter Storm Alfred, which results 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.

As noted above, CL&P installed a peak demand generator in Jewett City prior to Hurricane Irene that is designed to minimize brownouts. While it was originally touted as also being a source of backup power, CL&P did not activate it during Irene. Town officials believe this was because the system was too new to be properly understood, and the fact that it could not provide consistent power to the entire borough even if it was operated.

Although the Tree Warden actively enforces the tree ordinance, time and budgetary constraints hamper the Tree Warden's ability to be as effective as needed to help prevent wind problems. Pruning tree limbs should be conducted in addition to removal of older or dying trees. The town should look to work tree trimming/pruning into applications for projects within town and, wherever possible, seek an increase in funding improve upon its tree maintenance and pruning operation.

The town should implement the education of wind events and other natural hazards into educational curriculums for children in town wherever reasonable. Additionally, the town should tie into "National Hurricane Preparedness Week" which is organized by NOAA and, in 2012, ran from May 27th to June 2nd. Tying into national hazard educational weeks sponsored by governmental agencies increases the availability of information to the town, decreasing the amount of funds and resources the town needs to allocate towards such cause.

5.4 Potential Mitigation Measures, Strategies, and Alternatives

Many potential mitigation measures for hurricanes and tropical storms include those appropriate for inland and coastal flooding. These were presented in Section 5.7 and in Section 11.2.3 of the Multi-Jurisdictional HMP. General recommendations pertinent to all natural hazards that could affect the town are listed in Section 11 of this annex along with specific mitigation measures addressing the effects of heavy winds that are inherently caused by hurricanes.

6.0 SUMMER STORMS AND TORNADES

6.1 Setting / Historic Record

Similar to hurricanes, tropical storms and winter storms, wind damage associated with 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 summer 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 recent summer storms that impacted Griswold:

- ❑ 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.

6.2 Existing Programs, Policies, and Mitigation Measures

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.

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.

6.3 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 wind storms. 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.

The state has provided NOAA weather radios to all public schools as well as too 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.

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

6.4 Potential Mitigation Measures, Strategies, and Alternatives

Public education, warning and comprehensive annual tree maintenance are the best techniques to mitigate damage from hail, lightning, and tornadoes. These and other mitigation measures for wind damage are presented in Section 11.

7.0 WINTER STORMS AND NOR'EASTERS

7.1 Setting / Historic Record

Similar to summer storms 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, but only storms during the winter of 2010-2011 had a significant effect. 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.

7.2 Existing Programs, Policies, and Mitigation Measures

Existing programs applicable to winter storm winds are the same as those discussed in Sections 5.2 and 6.2. 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.

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 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.

7.3 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.

7.4 Potential Mitigation Measures, Strategies, and Alternatives

Potential mitigation measures for flooding caused by nor'easters include those appropriate for flooding that were discussed in Section 3.7 of the Multi-Jurisdictional HMP and Section 3.4 of this annex. Winter storm mitigation measures must also address blizzards, snow, and ice hazards. General potential mitigation measures that can be taken to reduce the effects of wind damage were discussed in Section 5.7 and in Section 11.2.3 of the Multi-Jurisdictional HMP. General recommendations pertinent to all natural hazards that could affect Griswold are listed in Section 11 of this annex. General and specific measures pertinent to reducing damage from winter storms on the town are listed in Section 11 under the categories of prevention, property protection, emergency services, public education and awareness, natural resource protection, and structural projects.

8.0 EARTHQUAKES

8.1 Setting / Historic Record

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 8 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.

8.2 Existing Programs, Policies, and Mitigation Measures

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.

8.3 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 10.0.

A complete *HAZUS-MH* analysis of the region for earthquake damage is detailed in the Regional Plan. 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.

8.4 Potential Mitigation Measures, Strategies, and Alternatives

Due to the low probability of occurrence, potential mitigation measures related to earthquake damage primarily include adherence to building codes, emergency response services, and the placement of utility infrastructure underground. These are mitigation measures common to all hazards as noted in Section 11 of this annex. The Multi-Jurisdictional HMP also includes additional recommendations for mitigating the effects of earthquakes. The pertinent recommendations to Griswold are reprinted in Section 11.

9.0 WILDFIRES

9.1 Setting

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.

9.2 Existing Programs, Policies, and Mitigation Measures

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 quick as possible.

9.3 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.

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 ten dry hydrants throughout town and has the ability to draft water from various streams, ponds, and river. It is the Fire Department's wish, however, to install additional dry hydrants. The Department has two brush trucks and a gator to access off-road fires.

9.4 Potential Mitigation Measures, Strategies, and Alternatives

Potential mitigation measures for wildfires include a combination of prevention, education, and emergency planning as presented in Section 11.

10.0 DAM FAILURE

10.1 Setting / Historic Record

Dam failures can be triggered suddenly with little or no warning and often in connection with natural disasters such as floods and earthquakes. Dam failures can occur during flooding when the dam breaks under the additional force of floodwaters. In addition, a dam failure can cause a chain reaction where the sudden release of floodwaters causes the next dam downstream to fail. While flooding from a dam failure generally has a limited geographic extent, the effects are potentially catastrophic depending on the downstream population. A dam failure affecting Griswold is considered an possible event each year as the town has six known dams classified equal to or higher than Class B. According to town officials, there are no known historical failures causing damage in Franklin.

The risk of a dam failure affecting Griswold is considered to be moderate as six major dams exist within Griswold along water bodies flowing through town. The town is concerned with the four CT DEEP-owned dams on the Pachaug River. This being said, no dam failures have affected the town since the time of the last HMP.

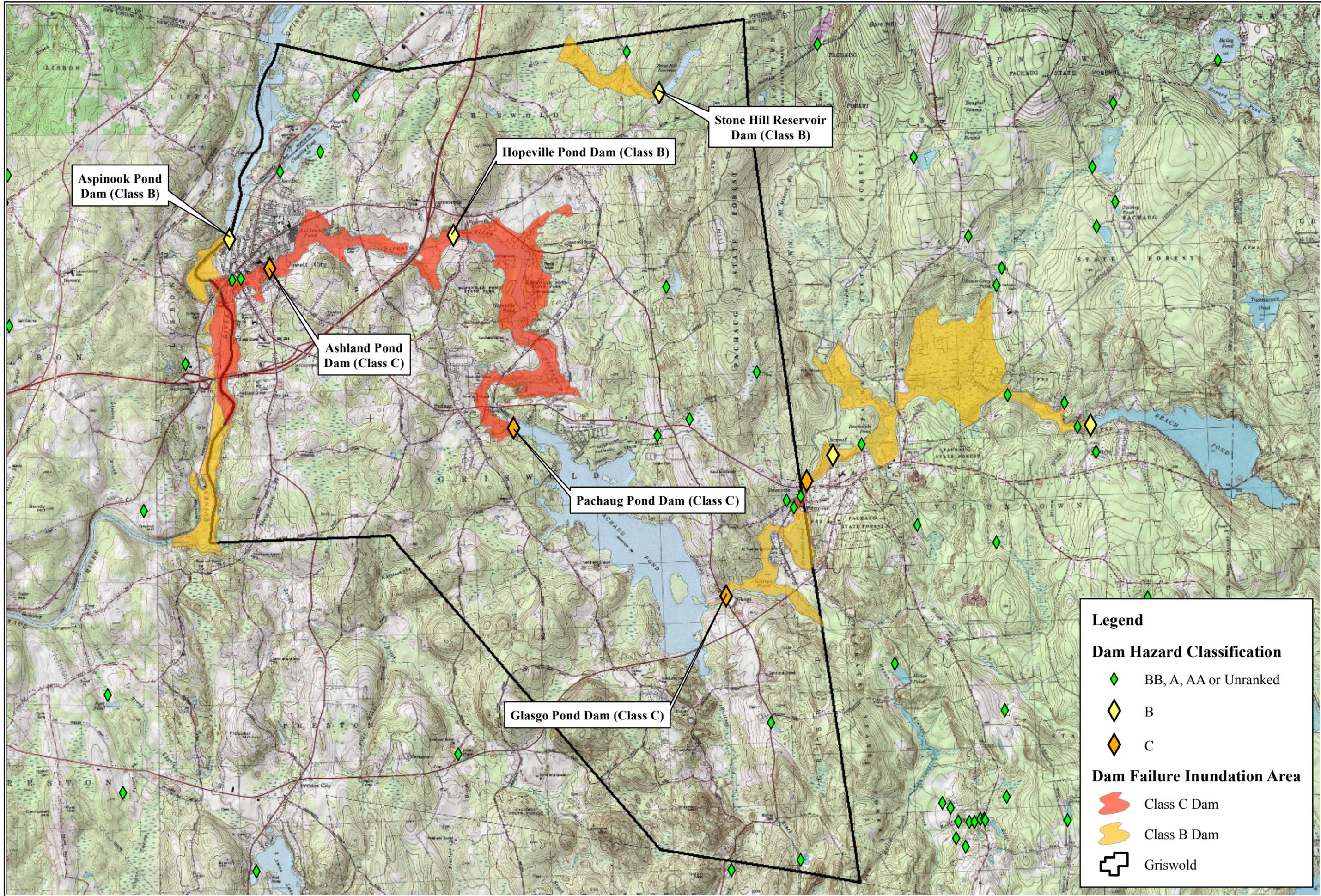
10.2 Existing Programs, Policies, and Mitigation Measures

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 EOPs. According to Connecticut DEEP Dam Safety files, a DFA was available for the Glasgo Pond Dam, the Ashland Pond Dam, the Pachaug Pond Dam, and the Aspinook Pond Dam as shown on Figure 10-1. Dams with an EOP on file at the same location include the Saw Mill Pond dam, Stone Hill Reservoir Dam, Ashland Pond Dam, and Pachaug Pond Dam.



Aspinoak Pond Dam (Class B)

Ashland Pond Dam (Class C)

Hopeville Pond Dam (Class B)

Pachaug Pond Dam (Class C)

Stone Hill Reservoir Dam (Class B)

Glasgo Pond Dam (Class C)

Legend

Dam Hazard Classification

- ◆ BB, A, AA or Unranked
- ◇ B
- ◇ C

Dam Failure Inundation Area

- Class C Dam
- Class B Dam
- Griswold

10.3 Vulnerabilities and Risk Assessment

The Connecticut DEEP administers the Dam Safety Section and designates a classification to each state-registered dam based on its potential hazard as detailed in the regional plan. According to the "Connecticut Dams" GIS data file that was published in 1996, there were 20 DEEP-registered dams within Griswold, of which nine were Class A, two were Class BB, three were Class B, and three were Class C. High and significant hazard dams in Griswold are listed in Table 8-1. 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 10-1
Dams Registered With the DEEP in the Town of Griswold**

Number	Name	Owner	Class
5801	Glasgo Pond Dam	CT DEEP	C
5803	Stone Hill Reservoir	Jewett City Water Company	B
5804	Ashland Pond	CT DEEP	C
5805	Pachaug Pond	CT DEEP	C
5807	Hopeville Pond Dam	CT DEEP	B
5811	Aspinook Pond	Private (Commercial)	B

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.

- 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 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 water power 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.

- ❑ 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 a 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.
- ❑ 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 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.

Griswold does not own any dams; however it does have concerns about the four 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 are 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.

10.4 Potential Mitigation Measures, Strategies, and Alternatives

Several recommendations related to mitigating potential damage to the Town from a dam failure are presented in Section 11.

11.0 RECOMMENDATIONS

11.1 Summary of Specific Recommendations

All recommendations presented in this plan for each hazard are summarized below:

11.1.1 Recommendations Applicable to All Hazards

Regional Coordination

- Continue to promote inter-jurisdictional coordination efforts for emergency response.
- Continue to promote local and regional planning exercises that increase readiness to respond to disasters.
- Continue to evaluate communication capabilities and pursue upgrades to communication and ensure redundant layers of communication are in place within Griswold and with other SCCOG communities, New London County, and the State of Connecticut.
- Continue to promote regional transportation planning through SCCOG to balance general transportation, shipping, and potential evacuation needs.
- Work with SCCOG to perform a regional study to identify the vulnerability of critical facilities that may be unable to withstand natural hazard damage. Emphasis should be placed on critical infrastructure, shelters and other sites to ensure structural integrity against various hazards and adequacy of backup supplies.
- Work with SCCOG to develop regional evacuation scenarios that include but build upon the Millstone evacuation plan.

Local Emergency Response

- Continue to review and update the Griswold EOP at least once annually.
- Add the HMP update as an annex to the town EOP.
- Continue to pursue funding for a town-wide Reverse 911 program such as the State of Connecticut's Alerts "Everbridge" System.
- Continue to maintain emergency response training and equipment and upgrade equipment when possible. Emergency response training and equipment shall continue to be ongoing and part of the weekly Fire Department training. Access to the Connecticut Eastern Region Response Integrated Team (CERRIT) will remain.
- Encourage Griswold officials to attend FEMA-sponsored training seminars at the Emergency Management Institute (EMI) in Emmitsburg, Maryland. All of these workshops are free of charge. Tuition, travel and lodging are provided by FEMA for the EMI training. Annual training sessions include emergency management, environmental reviews, the FEMA grant programs, the NFIP and CRS and others related to other hazards.

- ❑ Continue to evaluate emergency shelters, update supplies, and check communication equipment.
- ❑ Pursue ARC certification of A. A. Young Jr, Hose and Ladder Company No. 1 (Jewett City Fire Department, Station 56) which has a capacity of 75 people and the Griswold Elementary School which has a capacity of approximately 400 people in the gymnasium.
- ❑ Continue to promote dissemination of public information regarding natural hazard effects and mitigation measures into local governmental and community buildings. Specifically,
 - ⇒ Obtain copies of the disaster planning guides and manuals from the "Are You Ready?" series (<http://www.ready.gov/are-you-ready-guide>).
 - ⇒ Use national hazard mitigation weeks sponsored by governmental agencies to promote preparedness and educate the public. These weeks include: Flood Safety Awareness Week, National Hurricane Preparedness Week, National Sever Weather Preparedness Week, Lightening Safety Preparedness Week, and Fire Prevention Week.
 - ⇒ Encourage Griswold residents and other members to purchase NOAA weather radios with an alarm feature.
 - ⇒ Post hazard preparedness information on the Town of Griswold website. Include links to established sources at the State of Connecticut and FEMA.
 - ⇒ Prior to forecasted high hazard events, such as in the case of Tropical Storm Irene, continue to pass out information at the Fire Departments, town library, and businesses.
 - ⇒ Continue to perform well-being checks on elderly and disabled residents known to have issues during outages.
 - ⇒ Pursue funding for an information kiosk at Town Hall which would disseminate information including emergency mitigation and response materials.

Prevention

- ❑ 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.
- ❑ Utilize cell phone and social media following a forecasted significant weather event for the town to increase options of information streams to residents and businessmen and women in addition to television and radio. Consider packaging alerts through a single service to allow the simultaneous broadcast of information across all applicable platforms. (e.g. text messages and social media)
- ❑ 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.

- ❑ Continue reviewing building plans to ensure proper access for emergency vehicles.
- ❑ Continue to require the burying of utility lines wherever logical.
- ❑ Continue to enforce the appropriate building code for new building projects and exceed code design when possible. Review the enforceability of new buildings per the CT Building Codes, especially per wind specifications.
- ❑ Encourage Griswold residents and businesses to install and maintain lightning rods on their buildings.
- ❑ Review the SCCOG Evacuation Plan and consider composing a town-wide Plan.

11.1.2 Recommendations Applicable to Inland Flooding

- ❑ Continue to prohibit new development activities within SFHAs to the greatest extent possible within the Griswold land use regulations.
- ❑ Make available FEMA-provided flood insurance brochures at public accessible places such as the Fire Departments, local government buildings, and the Slater Library. Encourage residents to purchase flood insurance if they are located within a FEMA SFHA.
- ❑ Continue to regulate development in protected and sensitive areas, including floodplains, steep slopes and sites associated with wetlands. Wherever necessary, prohibit development in these areas.
- ❑ Utilize recently available extreme rainfall data to determine existing sizing of culverts. Encourage bridge replacements and culvert replacements in areas found to be undersized such as the drainage system on Sheldon Road.
- ❑ Continue to perform catch basin and culvert surveys each spring by the Public Works Department to determine the need for maintenance and cleaning and to identify and prioritize structures in need of replacement or upgrades.
- ❑ Pursue acquisitions or elevations of the two residences on Mill Road which each had up to six feet of water inundation in the basements during the March 2010 storms.
- ❑ Pursue HMGP funding to construct a flood wall around the WWTP to resolve inundation issues.
- ❑ Work with the owners of the Lakeview Mobile Home Park on Sheldon Road to pursue funding for acquisitions, elevations or relocations of the units as they were subject to inundation during the March 2010 rain events and were difficult to access via emergency vehicles.
- ❑ Pursue the funding of the acquisition of a floodprone property on Popple Bridge Road or a drainage system upgrade to the road as the property has repeatedly been subject to flooding and was subject to significant flooding during the March 2010 rainstorms.

- ❑ Pursue funding to elevate/replace bridges which have been historically prone to scouring including Edmond Road over the Patchaug River, Bitgood Road over Hopeville Pond (Patchaug River), Norman Road over the Patchaug River, and Ashland Street over the Patchaug River.
- ❑ Develop a priority list to pursue funding for the roadways which experienced nuisance flooding during the March 2010 rain events including Cross Road, Mill 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, Brewster Road at Route 164, and Terry Road. Work with the CT DOT to review/update the drainage network on Shetucket Turnpike (Route 165) near the bridge area between the ponds which also experienced flooding during the March 2010 rainstorms.
- ❑ Pursue funding to expand the Sheldon Road culvert downstream of Carol Road to increase the conveyance of Doanville Brook and resolve the backwater flooding that is impacting the dam beneath the Carol Road bridge and the bridge. The dam below Carol Road (Trailer Park Pond Dam) was installed by an "act of congress" and a substantially lengthy and expensive process would need to be undertaken.
- ❑ Work with the CT DOT to elevate the roadway and/or improve the drainage network to resolve the flooding issue along the stretch of Route 138 which was inundated by three to four feet of water during the flood of March 2010 and was closed for a period of three to five days.
- ❑ 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.

11.1.3 Recommendations Applicable to Wind Damage from Hurricanes, Tropical Storms, Summer Storms, Tornados, and Winter Storms

- ❑ Consider allocating an increase in annual funding for tree-trimming activities, especially on the major town roads such as: Taylor Hill Road/Ashland Street, Pleasant View Street, and Norman Road/Geer Road/Roode Road/Bitgood Road.
- ❑ Ensure that communication remains between the Public Works Department and the CT DOT for tree trimming/tree maintenance of State Routes and Interstate 395.
- ❑ Promote the use of functional shutters for older buildings within town to guard against window breakage which can result in structural failure. Investigate funding sources to promote this relatively inexpensive type of retrofitting on a large scale.
- ❑ Identify a location or locations within town for brush disposal operation for dealing with debris after wind storms. Determine how these trees can be reused within Griswold (chips, firewood, composting) to reduce costs of disposal and exporting.
- ❑ Consider surveying all town buildings to determine their ability to withstand wind loading, especially those designated as town shelters (both Fire Departments and the Griswold Middle School).

- ❑ Visit schools and educate children about the risks of natural hazard events and how to prepare for them.
- ❑ Consider adding tree maintenance and trimming language into regulations wherever possible.
- ❑ Make funding available to the Public Works Department each budget year for clearing snow roads and parking lots and be mindful that clearing snow from roofs may be needed in the future.
- ❑ Provide information for generally protecting residents during cold weather and for mitigating icing and insulating pipes at town residences.
- ❑ Continue to conduct snow load assessments of all flat-roofed and susceptible buildings of municipal and private homes following heavy snowfall events.
- ❑ Continue to maintain a supply of sand and salt at the Public Works Department Garage.
- ❑ Continue to give special attention to the steep roads in town including Norman Road where automobiles have historically been abandoned.
- ❑ Continue to identify areas that are difficult to access during winter storm events and develop contingency plans for emergency personnel.

11.1.4 Recommendations Applicable to Earthquakes

- ❑ Ensure that Franklin departments have adequate backup supplies and facilities for continued functionality in case earthquake damage occurs to these buildings where critical facilities are housed.
- ❑ Consider requiring new buildings be designed with the possibility of an earthquake built into the plans.
- ❑ Consider preventing residential development in areas prone to collapse such as at the base of steep slopes or in areas underlain by stratified drift and most prone to liquefaction.

11.1.5 Recommendations Applicable to Wildfires

- ❑ Continue to evaluate fire flows, available water supply, and areas at risk of wildfire within Griswold.
- ❑ Continue to maintain a fleet of vehicles with response capability to respond to forest fires. The Griswold Fire Departments maintain two brush trucks and a Gator for access to off-road fires.
- ❑ Consider the addition of dry hydrants to the available stock of ample hydrants within the Borough of Jewett City, 23 hydrants outside of Jewett City, and an additional ten hydrants throughout town.

- ❑ Maintain the Fire Department's ability to draft water from various streams, ponds, and rivers in town.
- ❑ Continue to support public outreach programs to increase awareness of forest fire danger, equipment usage, and protecting homes from wildfires. Educational materials should be made available at the Fire Marshal's office at the Town, the Slater Library, and both Fire Departments.
- ❑ Ensure that provisions of town regulations regarding fire protection facilities and infrastructure are being enforced.

11.1.6 Recommendations Applicable to Dam Failure

- ❑ Pursue a relationship with the CT DEEP to coordinate the release of water from the State-owned Pachaug River dams prior to major forecasted precipitation events, such as the storms of March 2010.
- ❑ Work with the Town of Voluntown, the CT DEEP, and the private owner to assess the Saw Mill Pond Dam as it has experienced erosion following the storms in March 2010 and its EOP states that failure would lead to a four foot rise in downstream water levels for four hours.
- ❑ Work with the Town of Voluntown, the CT DEEP, the Rhode Island DEM, and dam owners to conduct a coordination effort between owners of dams on the Pachaug River into Rhode Island for the release of water prior to significant precipitation events.

11.2 Prioritization of Specific Recommendations

As explained in Section 11.3 of the Multi-Jurisdictional HMP, the STAPLEE method was utilized in this annex to prioritize recommendations. Table 11-1 presents the STAPLEE matrix for the Town of Griswold. Each recommendation includes the town department responsible for implementing the recommendation, a proposed schedule, and whether or not the recommendation is new or originally from the previous HMP. Refer to Section 2.7 for the list of previous plan recommendations and whether or not each recommendation was carried forward into this HMP.

TABLE 11-1: TOWN OF GRISWOLD STAPLEE MATRIX FOR PRIORITIZING RECOMMENDATIONS

Implementation of Current Recommendations	Existing or New Recommendation?	Responsible Department ¹	Schedule	Cost ²	Potential Funding Source ³	Weighted STAPLEE Criteria ⁴														Total STAPLEE Score
						Benefits							Costs							
						Social	Technical (x2)	Administrative	Political	Legal	Economic (x2)	Environmental	STAPLEE Subtotal	Social	Technical (x2)	Administrative	Political	Legal	Economic (x2)	
ALL HAZARDS																				
Regional Coordination																				
Continue to promote inter-jurisdictional coordination efforts for emergency response	New	BD, FD	2012-2017	Minimal	OB	1	1	1	1	1	1	1	9.0				0.0	9.0		
Continue to promote local and regional planning exercises that increase readiness to respond to disasters	New	FD	2012-2017	Low	OB	1	1	1	1	1	0.5	1	8.0				0.0	8.0		
Continue to evaluate communication capabilities and pursue upgrades to communication and ensure redundant equipment is available	Existing	FD	2012-2017	Low	OB, CI	1	1	1	1	1	1	1	9.0				0.0	9.0		
Continue to promote regional transportation and evacuation planning through SCCOG	Existing	PL	2012-2017	Low	OB	0.5	1	1	1	1	0.5		6.5				0.0	6.5		
Work with the SCCOG to perform a regional study of the vulnerability of critical facilities to natural hazard damage	New	BD	2012-2017	Low	OB	0.5	0.5	0.5	0.5	1	0.5		4.5	-0.5			-0.5	-2.0	2.5	
Work with the SCCOG to develop regional evacuation scenarios that include but build upon the Millstone evacuation plan	New	PL, FD	2012-2017	Low	OB	1	0.5	1	0.5	1	0.5		5.5				-0.5	-1.0	4.5	
Local Emergency Response & Public Information																				
Continue to review and update the town EOP at least once annually	Existing	PL, FD, BD	2012-2017	Low	OB	1	1	1	1	1	1	1	9.0				0.0	9.0		
Continue to maintain emergency response training and equipment and upgrade equipment when possible	Existing	PL, FD, BD	2012-2017	Moderate	OB, CI	1	1	1	1	1	0.5	1	8.0				-0.5	-1.0	7.0	
Encourage town officials to attend FEMA-sponsored training seminars at EMI	New	PL	2012-2017	Minimal	OB	0.5	0.5	1	1	1	1	0.5	7.0				0.0	7.0		
Continue to evaluate emergency shelters, update supplies, and check communication equipment	Existing	PL, FD	2012-2017	Low	OB	1	1	1	1	1	1		8.0				0.0	8.0		
Continue to promote dissemination of public information regarding natural hazard effects into Government buildings, with additions	Existing	FD	2012-2017	Minimal	OB	1	1	1	1	1	1	1	9.0				0.0	9.0		
Employ a town-wide Reverse 911 system such as the CT Alerts Everbridge System	Existing	FD, PL	2012-2017	Minimal	OB	1	1	1	1	1	0.5	0.5	7.5	-0.5				-0.5	7.0	
Prevention																				
Integrate additional elements of this HMP into the Plan of Conservation and Development and EOP during the next updates	New	PL	2012-2017	Low	OB	1	1	1	1	1	1	1	9.0			-0.5		-0.5	8.5	
Continue reviewing building plans to ensure proper access for emergency vehicles	New	FD	2012-2017	Minimal	OB	1	1	1	1	1	1		8.0				0.0	8.0		
Require the underground installation of utilities for all new development and pursue opportunities to put existing lines underground	Existing	PZ, BD	2012-2017	Minimal	OB	1	1	1	1	1	0.5		7.0			-0.5		-0.5	6.5	
Consider expanding street tree planting programs and maintenance while recommending appropriate trees near overhead wires	New	PW, BD	2017-2022	Moderate	OB	0.5	0.5	1	1	1	0.5	0.5	6.0	-0.5				-1.0	5.0	
Continue to enforce the appropriate building code for new building projects	New	BD	2012-2017	Minimal	OB	1	1	1	1	1	1		8.0				0.0	8.0		
Encourage residents to install and maintain lightning rods on their structures	New	FD	2012-2017	Minimal	OB	1	0.5	1	1	1	0.5	0.5	6.5				0.0	6.5		
Natural Resource Protection & Open Space																				
Continue to protect watercourses, inland wetlands, steep slopes greater than 15%, and inland floodplains	New	BD, PZ	2012-2017	Minimal	OB	1	1	1	1	1	1	1	9.0				0.0	9.0		
Consider requiring the deduction of wetlands, watercourses, steep slopes greater than 20%, and floodplains from development area calcs	New	PZC	2012-2017	Minimal	OB	0.5	1	1	1	1	1	1	8.5				0.0	8.5		
Strive to ensure that any open space acquired be preserved in perpetuity	New	PZ, PL, BS	2012-2017	Minimal	OB	1	1	1	1	1	1	1	9.0				0.0	9.0		
Modify the open space provisions in the Subdivision Regulations to require every residential subdivision make a provision for open space	New	PZ	2017-2022	Minimal	OB	1	1	1	0.5	1	1	1	8.5			-0.5		-0.5	8.0	
Consider expanding the open space set-aside requirement to all other types of residential development	New	PZ	2017-2022	Minimal	OB	0.5	1	0.5	0.5	1	1	1	7.5			-0.5		-0.5	7.0	
Seek to identify and preserve areas with high passive recreational potential as open space and as part of a waterfront pathway network	New	PL, BS	2017-2022	Low	OB	1	0.5	0.5	1	1	1	0.5	7.0	-0.5			-0.5	-1.5	5.5	
FLOODING RECOMMENDATIONS																				
Prevention																				
Continue to prohibit new development activities within SFHAs to the greatest extent possible within town land use regulations	New	PZ	2012-2017	Minimal	OB	1	1	1	1	1	1	1	9.0				0.0	9.0		
Require developers to demonstrate whether detention or retention of stormwater is the best option for reducing peak flows downstream	New	PZ, BD	2012-2017	Minimal	OB	0.5	1	1	1	1	1	0.5	8.0				0.0	8.0		
Review local Subdivision Regulations and evaluate incorporating further limitations on impermeable surfaces in floodprone areas	New	PZ, PL	2012-2017	Low	OB	1	0.5	1	1	1	0.5	1	7.0			-0.5		-0.5	6.5	
Consider an ordinance placing responsibility for stream maintenance on the property owner with town enforcement	New	PZ, BD	2017-2022	Minimal	OB	0.5	1	1		0.5	1	1	7.0	-1		-1		-2.0	5.0	
Conduct an annual inspection of floodprone areas that are publically accessible. Recommend drainage improvements as appropriate.	New	PW	2012-2017	Low	OB	1	1	1	0.5	1	0.5	0.5	7.0				0.0	7.0		
Pursue the acquisition of floodprone properties on Mill Street and on Popple Bridge Road	New	PL	2012-2017	High	CI*	1	1	1	1	1	1	0.5	8.5	-0.5		-0.5		-1	-3.0	5.5

TABLE 11-1: TOWN OF GRISWOLD STAPLEE MATRIX FOR PRIORITIZING RECOMMENDATIONS

Implementation of Current Recommendations	Existing or New Recommendation?	Responsible Department ¹	Schedule	Cost ²	Potential Funding Source ³	Weighted STAPLEE Criteria ⁴														Total STAPLEE Score
						Benefits							Costs							
						Social	Technical (x2)	Administrative	Political	Legal	Economic (x2)	Environmental	STAPLEE Subtotal	Social	Technical (x2)	Administrative	Political	Legal	Economic (x2)	
Property Protection																				
Incorporate information on the availability of flood insurance into all hazard-related public education workshops	New	PL	2012-2017	Low	OB	1	1	0.5	0.5	1	1		7.0	-0.5				-0.5	6.5	
Make available FEMA-provided flood insurance brochures and encourage residents to purchase insurance if they are in a SFHA	New	PL	2012-2017	Minimal	OB	1	1	1	1	1	1		8.0					0.0	8.0	
Make necessary changes to floodplain regulations so that all insured residents are eligible for increased cost of compliance coverage	New	PZ, PL	2012-2017	Low	OB	1	1	0.5	0.5	1	1		7.0	-0.5				-0.5	6.5	
Encourage residents to submit flood insurance claims following damage events	New	All	2012-2017	Minimal	OB	1	1	1	1	1	1		8.0					0.0	8.0	
Emergency Services																				
Ensure that the EOP provides detailed instructions regarding the evacuation procedures within town	New	PL, FD	2012-2017	Low	OB	1	1	1	1	1	1		8.0					0.0	8.0	
Investigate locations and labor involvement for the pre-event stockpiling of sand bags for use in floodprone areas	New	FD, PL	2012-2017	Low	OB	1	1	1	1	1	1		8.0	-0.5			-0.5	-1.0	7.0	
Pursue mutual aid agreements with non-profits to provide volunteer labor for filling sand bags and other response activities	New	FD	2012-2017	Low	OB	1	1	1	1	1	1		8.0					0.0	8.0	
Identify the locations of and pursue the establishment of Fire Department substations in areas not adequately served by the Departments	New	FD, PL	2012-2018	High	OB	1	1	1	1	1	1		8.0					0.0	8.0	
Public Education and Awareness																				
Conduct a "Natural Hazards Fair" so that interested parties can familiarize themselves with natural hazard mitigation options	New	PL	2012-2017	Moderate	OB	1	1	0.5	0.5	1	1		7.0		-0.5	-0.5		-1.0	6.0	
Visit schools and educate children about the risks of flooding and how to prepare	New	FD	2012-2017	Low	OB	1	1	1	1	1	1		8.0					0.0	8.0	
Annually distribute a brochure outlining the risks of floodprone areas, mitigation strategies, and contacts	New	PL	2012-2017	Low	OB	1	1	1	1	1	1		8.0	-0.5				-0.5	7.5	
Encourage builders, developers, and architects to become familiar with NFIP land use and building standards at annual workshops	New	PL, ZE	2012-2017	Low	OB	1	1	1	1	1	1		8.0		-0.5			-0.5	7.5	
Continue to pursue funding for an information kiosk outside of Town Hall	New	PL	2012-2017	Moderate	OB	1	1	0.5	1	1	1		7.5		-0.5			-0.5	7.0	
Structural Projects																				
Encourage the use of floodplain storage and other flood control methods in new developments and at existing properties where appropriate	New	PZC	2012-2017	Minimal	OB	1	1	0.5	1	0.5	1		7.0	-0.5				-1	-2.0	5.0
Utilize the recently available extreme rainfall data to determine existing culvert sizing and encourage upgrades where undersized	New	PW	2012-2017	Moderate	CI	0.5	1	1		1	0.5		5.5			-1	-0.5	-2.0	3.5	
Continue to perform catch basin and culvert surveys to prioritize upgrades and perform maintenance and cleaning	Existing	PW	2012-2017	Moderate	OB	1	1	1	1	1	0.5	0.5	7.5					0.0	7.5	
Investigate funding and feasibility of mitigating frequent drainage problems	Existing	PW, PL	2012-2017	Low	OB	1	1	1	1	1	1		8.0					0.0	8.0	
Pursue the receipt of funding under the HMGP to improve roadway drainage at Sheldon Road	New	PW, BS	2012-2017	Moderate	CI	0.5	1		1	1	0.5		5.5					0.0	5.5	
Pursue the receipt of funding under the HMP to construct a retaining wall for the Volunteer Fire Department, Station 55	New	PL, FD	2012-2017	High	CI*	1	1	1	1	1	1	1	9.0		-0.5			-1	-2.5	6.5
If acquisition is not possible, pursue a drainage upgrades for the floodprone residences on Mill Street Popple Bridge Road	New	PW	2012-2017	High	CI*	1	1	1	1	1	1	0.5	8.5	-0.5	-0.5			-1	-3.0	5.5
WIND DAMAGE RELATED TO HURRICANES, SUMMER STORMS, TORNADOES, AND WINTER STORMS																				
Prevention																				
Work with the State to locate NOAA weather radios in commercial buildings with large populations and educate managers to use them	New	FD	2012-2017	Low	OB	0.5	1	0.5	0.5	1	1		6.5					0.0	6.5	
Ensure that building codes relative to wind safety are being properly enforced	New	BD	2012-2018	Low	OB	0.5	1	0.5	0.5	1	1		6.5					0.0	6.5	
Property Protection																				
Promote the use of functional shutters for older buildings in the town and investigate funding sources	Existing	PL	2012-2017	Low	OB, CI	1	0.5	1	1	1	0.5		6.0					0.0	6.0	
Make information on wind-resistant construction techniques available to all building permit applicants	New	BD	2012-2017	Low	OB	1	1	1	1	1	1		8.0					0.0	8.0	
Encourage commercial building owners to develop emergency response plans and identify mitigation opportunities	New	PL, FD	2012-2017	Low	OB	0.5	1	1	0.5	1	1		7.0			-0.5		-0.5	6.5	
Emergency Services																				
Identify a location for a brush-disposal operation for dealing with debris following wind storms and determine potential reuse	New	PW, PL	2012-2017	Minimal	CI	0.5	1	1	1	1	1		7.5					0.0	7.5	
Consider surveying all town-owned buildings, particularly historic buildings to determine their ability to withstand wind loading	New	FD, BD	2012-2017	Low	OB	1	0.5	1	0.5	1	0.5		5.5					0.0	5.5	
Develop agreements with landowners and companies to chop/chip to ensure backup plans are in place for debris removal	New	PW	2012-2017	Low	OB	0.5	0.5	1	0.5	1	0.5		5.0					0.0	5.0	
Prioritize wind-related retrofitting for the town's shelters over other critical facilities	New	BS	2012-2017	Moderate	CI*	0.5	0.5	1	0.5	1	0.5		5.0				-0.5	-1.0	4.0	

TABLE 11-1: TOWN OF GRISWOLD STAPLEE MATRIX FOR PRIORITIZING RECOMMENDATIONS

Implementation of Current Recommendations	Existing or New Recommendation?	Responsible Department ¹	Schedule	Cost ²	Potential Funding Source ³	Weighted STAPLEE Criteria ⁴												Total STAPLEE Score									
						Benefits						Costs															
						Social	Technical (x2)	Administrative	Political	Legal	Economic (x2)	Environmental	STAPLEE Subtotal	Social	Technical (x2)	Administrative	Political		Legal	Economic (x2)	Environmental	STAPLEE Subtotal					
Public Education and Awareness																											
Visit schools and educate children about the risks of wind events and how to prepare for them	New	FD	2012-2017	Low	OB	1	1	1	1	1	0.5						7.0							0.0	7.0		
Conduct an annual workshop so that interested parties can familiarize themselves with wind mitigation	New	PL	2012-2017	Moderate	OB	1	1	0.5	0.5	1	1						7.0			-0.5	-0.5					-1.0	6.0
Work with local homeowners associations and community groups to provide education regarding wise landscaping and proper tree planting	New	PL	2012-2017	Low	OB	0.5	1	1	1	1	1						7.5			-0.5						-0.5	7.0
WINTER STORMS																											
Continue making funding available to the Public Works Department each year for clearing snow from roads and parking lots	New	BS	2012-2017	High	OB	1	1	1	1	1	0.5						7.0								0.0	7.0	
Provide information for protecting town residents during cold weather and for mitigating icing and insulating pipes at residences	New	FD, PL	2012-2017	Low	OB	1	1	1	1	1	1						8.0								0.0	8.0	
Continue to identify areas that are difficult to access during winter storm events and develop contingency plans to access such areas	New	PL, FD	2012-2017	Minimal	OB	1	1	1	1	1	1						8.0								0.0	8.0	
EARTHQUAKES																											
Ensure that town departments have adequate backup supplies and facilities for continued functionality following an earthquake	New	BD	2012-2017	Moderate	OB, CI		0.5	1	0.5	0.5							3.0			-0.5	-1					-2.0	1.0
Consider preventing residential development in areas prone to collapse such as below steep slopes or areas prone to liquefaction	New	PZ	2012-2017	Minimal	OB	0.5	1	1	0.5	0.5	1	0.5					7.0				-0.5					-0.5	6.5
WILDFIRES																											
Continue to evaluate fire flows, available water supply, and areas at risk of wildfire in the town	Existing	FD	2012-2017	Minimal	OB	1	1	1	1	1	0.5						8.5								0.0	8.5	
Continue to support public outreach programs to increase awareness of forest fire danger, equipment usage, and protecting homes	New	FD	2012-2017	Low	OB	1	1	1	1	1	0.5	1					8.0								0.0	8.0	
Ensure that provisions of town regulations regarding fire protection facilities and infrastructure are being enforced	New	PW	2012-2017	Low	OB	0.5	0.5	1	0.5	1	0.5						5.0								0.0	5.0	
DAM FAILURE																											
Work with CT DEEP to ensure that the owners of high hazard dams have current EOPs and keep local copies	New	PL	2012-2017	Minimal	OB	1	1	1	1	1	1						8.0								0.0	8.0	
Provide assistance to the owners of lesser ranked dams regarding resources available for inspections and maintenance	New	ZE	2012-2017	Minimal	OB	0.5	0.5	0.5	0.5	1		0.5					4.0								0.0	4.0	

NOTES

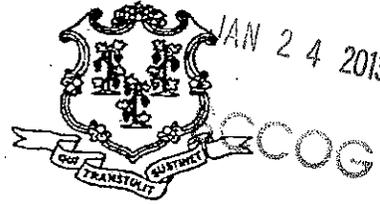
- Departments:
 - BS = Board of Selectmen
 - FD = Fire Department (Both the Griswold Volunteer Fire Department, Station 55 & the A.A. Young Jr., Hose & Ladder Co. No. 1, Station 56)
 - PW = Public Works Department
 - PL = Planning & Community Development Office
 - PZ = Planning & Zoning Commission
 - BD = Building Department
- Minimal = To be completed by staff or volunteers where costs are primarily printing, copying, or meetings; Low = Costs are less than \$10,000; Moderate = Costs are less than \$100,000; High = Costs are > than \$100,000.
- OB = Operating Budget; CI = Capital Improvement budget; a * indicates that grant funding is needed and will be pursued
- A beneficial or favorable rating = 1; an unfavorable rating = -1. Technical and Financial benefits and costs are double-weighted (i.e. their values are counted twice in each subtotal)

APPENDIX A
ADOPTION RESOLUTION



Town of Griswold

28 Main Street
Griswold, CT 06351
Phone: 860-376-7060, Fax: 860-376-7100



CERTIFIED RESOLUTION

I, Ellen Dupont, Town Clerk of the Town of Griswold, do hereby certify that the following is a true and correct copy of a resolution duly adopted at a meeting of the Board of Selectmen duly held and convened on the 22nd day of January 2013, at which a constituted quorum of the Board of Selectmen was present and acting throughout, and further certify that said resolution has not been modified, rescinded or revoked and is, at present, in full force and effect.

TOWN OF GRISWOLD HAZARD MITIGATION PLAN UPDATE

WHEREAS, the Town of Griswold has historically experienced severe damage from natural hazards and continues to be vulnerable to the effects of flooding, thunderstorms, high wind, winter storms, wildfires, earthquakes, and dam failure, resulting in loss of property and life, economic hardship, and threats to public health and safety;

WHEREAS, the Southeastern Connecticut Council of Governments, of which the Town of Griswold is a member, has developed and received conditional approval from the Federal Emergency Management Agency (FEMA) for its Hazard Mitigation Plan Update under the requirements of 44 CFR 201.6;

WHEREAS, the plan specifically addresses hazard mitigation strategies and Plan maintenance procedures for the Town of Griswold;

WHEREAS, the Plan recommends several hazard mitigation actions/projects that will provide mitigation for specific hazards that impact the Town of Griswold, with the effect of protecting people and property from loss associated with those hazards;

WHEREAS, adoption of this Plan will make the Town of Griswold eligible for funding to alleviate the impacts of future hazards;

NOW THEREFORE BE IT RESOLVED by the Board of Selectmen of the Town of Griswold that:

1. The plan is hereby adopted as an official plan of the Town of Griswold;
2. The respective officials identified in the mitigation strategy of the Plan are hereby directed to pursue implementation of the recommended actions assigned to them;
3. Future revisions and Plan maintenance required by 44 CFR 201.6 and FEMA are hereby adopted as part of this resolution for a period of five (5) years from the date of this resolution.
4. An annual report on the progress of the implementation elements of the Plan shall be presented to the First Selectman and Board of Selectmen by October 1 of each calendar year.

PASSED by the Board of Selectmen this 22nd day of January, 2013.

CERTIFIED By:

Ellen Dupont, Town Clerk

Griswold, Connecticut

This 23rd day of January 2013

