

**HAZARD MITIGATION PLAN
ANNEX
FOR
TOWN OF GROTON, CONNECTICUT**

**An Annex of the
Southeastern Connecticut
Regional Hazard Mitigation Plan**

PREPARED FOR:

**Southeastern Connecticut
Council of Governments**

DATE: June 2005



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TABLE OF CONTENTS

<u>SECTION</u>	<u>PAGE NUMBER</u>
I. INTRODUCTION	1
A. Setting	1
B. Purposes of Annex	2
C. Plan Development Process and Public Involvement	2
II. HAZARD RISK ASSESSMENT	3
A. Residential	5
B. Commercial/Industrial	7
C. Critical Facilities	7
D. Transportation Corridors	7
III. HAZARD MITIGATION MEASURES	9
A. Prevention	9
B. Property Protection	11
C. Emergency Services	11
D. Structural Projects	12
E. Public Information	13
IV. HAZARD MITIGATION PROJECT RANK	15
V. IMPLEMENTATION, MONITORING, AND EVALUATION	16

APPENDICES

- APPENDIX A- HAZARD MITIGATION PROJECT LOCATION / RANKING MATRIX
- APPENDIX B - HAZARD ASSESSMENT MAP

I. INTRODUCTION

A. Setting

The Town of Groton is located in the south-central portion of New London County and incorporates the borough area of the City of Groton in the southwest portion of town. The town is bordered by the Town of Stonington to the east, the Town of Ledyard to the north, the Thames River to the west, and Fishers Island Sound which forms the southern boundary of the Town of Groton. The City of New London and the Town of Waterford are located further to the west and northwest across the Thames River from Groton.

A large tract of land called Bluff Point, a State coastal preserve, lies along the shoreline between the Poquonnock River estuary and Mumford Cove. Groton-New London Airport is located within the south-central portion of Groton. The U.S. Naval Submarine Base is situated along the Thames River in the Towns of Groton and Ledyard. A large number of residents living in the Town of Groton are from the submarine base. Other notable employers in the area include the Pfizer Corporation, Electric Boat, and the University of Connecticut at Avery Point.

The Town of Groton has an extensive coastline which includes two peninsulas (Groton Long Point and Noank) as well as the Mystic River and its shoreline. Groton has a population of 39,907 according to the 2000 U.S. Census.

Numerous residential, commercial, and industrial structures are concentrated along the western town boundary within a mile of the shores of the Thames River.

At the northwestern corporate limits, U.S. Route 12 enters the town, proceeds south, runs into U.S. Route 1, and then turns east, over the Mystic River. Numerous residential and commercial structures are located along U.S. Routes 1 and 12. Due to the rapidly rising slopes from the Thames River, the majority of structures in this area are elevated above the Thames River floodplain.

In addition to the many streams which flow through the town, two large reservoirs (Groton and Pohegnut) and several small bodies of water including Buddington Pond, Smith Lake, and Beebe Pond are located within the town.

B. Purpose of Annex

The purpose of this annex is to provide hazard risk assessment, capability assessment, hazard mitigation measures, and a hazard mitigation project ranking for the Town of Groton. Hazards such as earthquakes and windstorms which affect the entire region are addressed in the Southeastern Connecticut Council of Governments Regional Hazard Mitigation Plan.

C. Plan Development Process and Public Involvement

The Regional Hazard Mitigation Plan and this annex were developed through a series of meetings and the completion of written questionnaires, personal interviews, and workshops. To provide oversight of the plan development process and maximize local involvement, all member communities in the region and the two tribal affiliate members were invited to appoint a representative to serve on the Hazard Mitigation Steering Committee. Committee members and chief elected officials received notices of all the committee meetings and were encouraged to attend. Meeting notices and agendas were also sent to area media and to town and city clerks for posting in each community. Steering committee meetings were held in public at the Southeastern Connecticut Council of Governments office in Norwich. Three steering committee meetings were held during the development of the hazard mitigation plan. Verbal reports on progress were given to monthly meetings of the Southeastern Connecticut Council of Governments, which are routinely attended and covered by area press in local newspapers. Articles describing the planning process have appeared in the three issues of the SCCOG Quarterly Newsletter since March, 2003. This newsletter is mailed to 285 officials, organizations, and media within the region.

II. HAZARD RISK ASSESSMENT

A meeting was held with local officials on September 9, 2003 to develop a risk assessment for the Town of Groton. Based on the results of the meeting and additional risk assessment research it was determined that the most significant natural hazard in the Town of Groton is flooding.

The most severe flooding in the Town of Groton is due to hurricanes or other coastal storms. These storms, with their intense winds and rainfall, can create abnormally high tidal surges, wave action, and peak runoff. When the storm track of the hurricane is west of the community, the counter-clockwise winds of the hurricane tend to increase the adverse effect of the tidal surge. Hurricanes normally occur in late summer or early fall. However, damaging storms can also occur in winter and spring as the result of nor'easters or rainfall events, when flooding problems can be compounded by ice jams and runoff from snowmelt.

A hurricane survey prepared by the U.S. Army Corps of Engineers (COE) indicates a preliminary study has been made for breakwater protection of the New London Harbor area. Construction of breakwaters would be beneficial to the City of Groton and the Town of Groton since wave impacts along the Thames River would be reduced. However, the construction of breakwaters is not under consideration at this time.

Buildings located in flood hazard areas are primarily residential but also include some commercial, industrial, and critical facility structures. Most of the structures that are threatened by flooding are located within the 100-year floodplain, but some are also in the coastal velocity zone. Location in the velocity zone poses an increased threat to structures due to high wind and potential wave damage, as well as inundation by flood waters.

The entire coastline of Groton is subject to flooding and coastal storm damage, as are the peninsula areas of Noank and Groton Long Point, which are entirely exposed.

Noank has a total land area of 1.4 square miles. It is located along the southwest shore of Mystic Harbor, and the southern tip of Noank forms a peninsula. The shores of Noank have long been the site of boat yards, commercial, and residential developments such as the Noank Shipyard, Abbott's Lobsters, and the Morgan Point Lighthouse, which is now a private residence. The adjacent areas of Beebe Cove and Spencer Point are protected by old walls and riprap.

The low-lying shoreline areas of Noank are subject to periodic flooding by severe high tides and damage by wind-driven waves during hurricanes, tropical depressions, and nor'easters. Due to the relatively large number of residences, the potential for heavy flood damage exists along the shores of Palmer, West, and Beebe Coves. Also, in Noank on the southeast tip of the peninsula, a large number of both residential and commercial buildings are susceptible to flood damage.

There are presently no flood control structures or future plans for such structures in Noank.

Groton Long Point is another section in the Town of Groton that is located on a small peninsula on the coast of Fishers Island Sound. Residential, commercial, and conservation districts make up Groton Long Point's area of 0.45 square miles.

Being a peninsula bordered by tidal waters, Groton Long Point is subject to varying degrees of tidal flooding on all sides. The land is relatively flat and almost all of the area lies below the 10-foot elevation.

Residences are heavily concentrated along the coastline and they are subject to damage from tidal flooding with wave action. Many residential and commercial structures are located in low-lying areas further inland and though not subject to damage from waves, they are subject to tidal flooding.

The southern portion of Groton Long Point, in the Shore Avenue area, is exposed to the wave action from Fishers Island Sound. This location has been exposed to the most flood damage in the past. The shoreline structures along Mumford and Palmer Coves have also experienced wave damage, but to a lesser degree.

Seawalls ring the southwestern and southern parts of the shoreline and run for about 1,000 feet along the eastern coast. These seawalls protect the southwestern point that projects into Fishers Island Sound.

The Town of Groton has no formalized program currently in place to identify the location or the number of structures that are susceptible to flooding. Such information would be valuable in directing hazard mitigation efforts to locations with the greatest risk. A potential hazard mitigation project would involve the review of all existing available data regarding flood hazards and the preparation of an inventory and assessment of structures at risk in the coastal flood hazard areas.

Such an inventory program would be the first step in completing a Flood Audit, which would provide early flood warning, guidance and technical information regarding flood risks to property owners, as well as prioritize future property protection projects. The completion of a Flood Audit would be an important step in the National Flood Insurance Program Community Rating System by which the Town of Groton can qualify for a reduction in flood insurance rates.

A. Residential

Based on a review of the Town of Groton's Flood Insurance Rate Maps and topographic maps, residential structures that are subject to flooding during significant flood events are primarily in the southern section of the town and are impacted by coastal flooding.

Most of Groton's velocity zones are located along the immediate shoreline. The beachfront properties in the velocity zone are very susceptible to damage.

The Town of Groton shoreline has several flooding sources which include Mumford Cove, Palmer Cove, Fishtown Brook, and Fishers Island Sound. There are many residential structures located in flood zones in these areas around the shoreline. Roads in the flood hazard area include Midway Oval, Hartford Court, and sections of Joliet Court, Birmingham Court, and Concord Court, which are flooded by Mumford Cove. Rhonda Drive and Farmstead Avenue flood zones are affected by Fishtown Brook. Palmer Cove floods Haley Farm Road and Beebe Cove affects a flood zone on Route 215.

Groton is a year-round community which intensifies risk to life and property for those who live in the coastal area. Beachfront properties are very susceptible to damage, not only as a result of flooding, but also because the dynamic nature of the beach system results in shoreline erosion in some locations.

Repetitive flood insurance claims have been filed at one property in Groton.

The Mystic River affects many roadways and structures in the flood zone from the mouth of the river to the end of River Road, which is the eastern corporate limits of Groton. Along the Mystic River many of the roads in the flood zones include the roads around Spencer Point and Willow Point, and Water Street. Town officials are concerned with Willow Point due to its low-lying areas and the potential for the area to be isolated during flooding. The shoreline roads between Route 1 and I-95 are affected by potential flooding as well as several areas on River Road on the northern side of I-95.

Groton Long Point is a highly populated section of the Town of Groton. It is a low-lying peninsula, surrounded by Fishers Island Sound on three sides. The entire area of Groton Long Point except for a few roads including Duryea Drive, Burrows Street, Smith Street, and several other elevated areas, are in the flood zone. Groton Long Point's entire shoreline is a velocity zone and many structures have the potential to be damaged by waves and storm surges. The Groton Long Point Road bridge is the only access/egress to the area and utilities pass along the bridge to the Groton Long Point residents. Town officials have expressed concern because of the sole access/egress as well as the fact that gradual shifting of rip-rap along the bridge could be catastrophic during a major storm. There are approximately 1,200-1,300 persons living in Groton Long Point during the winter months and 3,000 to 4,000 residents in the summer months.

Another highly populated section of Groton is Noank. Noank is also a peninsula that is surrounded by Fishers Island Sound, however, most of the land is elevated above the flood zone. A few of the roads with structures located in the flood zone include Morgan Point, Marsh Road, Noble Avenue, and sections of Elm Street, Front Street, and Brook Street. There are numerous cul-de-sacs along Noank's shoreline which are also affected by tidal flooding. The entire shoreline of Noank is in a velocity zone and structures may be damaged by waves and storm surge during severe storms.

B. Commercial/Industrial

There are several areas of commercial and industrial properties that have been identified as being located within the floodplain and are considered to be susceptible to damage. One area of potential flooding is along the Mystic River where many commercial and residential structures are mixed together.

Several industrial areas of concern include Poquonnock Road, Thomas Road, and the intersection of Poquonnock Road and High Rock Road that are potentially affected by Birch Plain Creek. Also of concern is the Electric Boat "Annex" facility on Poquonnock Road. Town officials have expressed concern that this area acts as a dam for up basin watershed drainage and thus poses a possible stormwater, flooding, and erosion hazard.

C. Critical Facilities

A review of the Town of Groton's critical public facilities indicates most of the facilities are not in flood hazard areas. However, one facility of concern is the Groton-New London Airport. The entire Groton-New London Airport is located in a flood zone and thus plane landing or takeoff from the airport may be impacted during a significant storm event.

D. Transportation Corridors

Groton has several major transportation facilities such as Interstate 95, Route 1, Route 12, Route 184, Route 117, and the Amtrak and Providence/Worcester rail lines. A series of crossings of the railroad and the highway have been constructed to allow passage of roadways under and over the highway and railroad. Amtrak and Providence/Worcester tracks cross the town from northwest to southeast. The embankments for the tracks act as dikes in limiting the encroachment of tidal floods.

There are many roadways throughout the Town of Groton that are in potential flood zones. These roads include South Road at the intersection of Route 1, which is impacted by the Poquonnock River, Buddington Road near Hempstead Brook, and Neptune Road, Anchorage Circle, and Skyline Road which are impacted by potential flooding by Mumford Cove. The Mystic River impacts Cedar Road.

Town officials are concerned with Amtrak underpasses such as Poquonnock Road and South Road. Poquonnock Road and South Road have underpasses beneath Amtrak high speed rail lines. These low bridges, under perfect conditions make passage of emergency vehicles difficult, when these areas are flooded out they are not passable and emergency services are forced to take a longer route. Town officials are concerned that problems could also arise with the evacuation of people and getting materials to residents.

Town officials have also expressed concern with increased thru-traffic in Groton. Specifically, the town is concerned with the transportation of hazardous materials over their ability to respond to a major incident regarding a release of such materials.

III. HAZARD MITIGATION MEASURES

The following sections provide a brief description of the types of hazard mitigation measures and programs that are available to address the natural hazards that exist in the Town of Groton.

A. Prevention

Hazard prevention includes identification of risks and the use of land-use regulatory and other available management tools to prevent future damage. The Town of Groton has planning and zoning tools in place that incorporate floodplain management. The town's planning and zoning regulations, inland wetlands and watercourses regulations, harbor management 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 following are examples of how hazard prevention can be accomplished through existing programs:

1. Planning and Zoning

Planning and Zoning Regulations can be tailored to be consistent with hazard mitigation planning. Establishment of Flood Prone Conservancy Districts, Coastal Resource Zones, and River Corridor Preservation Zones are all techniques that can potentially be employed to limit additional development in hazardous locations.

2. Open Space Preservation

Community planning that includes open space acquisition and preservation sections can be established or revised in a manner that is consistent with hazard mitigation planning. Acquisition of floodplain and river corridor properties should be encouraged as a municipal priority.

3. Floodplain Development Regulations

The modification of floodplain management regulations to include more restrictive development standards is consistent with hazard mitigation planning. The National Flood Insurance Program Community Rating System gives credit to communities that exceed the minimum floodplain management requirement of the National Flood Insurance Program. Requirements include elevating structures higher than the 100-year base flood elevation, which is an example of a more stringent standard.

4. Stormwater Management

Stormwater management regulations that limit any potential increase in the state of discharge of stormwater and that preserve floodplain storage are examples of the use of stormwater management in a manner consistent with hazard mitigation planning.

5. Wetlands Protection

Wetlands areas are generally also critical flood storage areas. By limiting wetlands development not only are important natural resource areas protected but additional floodplain development is also limited.

6. Erosion and Sediment Control Regulation

Effective implementation of sediment and erosion controls include utilization of detention basins and use of other Best Management Practices to slow the velocity and limit increase in runoff. Strict adherence to these requirements are effective hazard mitigation tools.

B. Property Protection

Property protection measures can address hazards at a single structure or can include multiple structures. The following list identifies common property protection measures:

1. Relocation
2. Acquisition
3. Building Elevation
4. Utility Protection
5. Flood Proofing

Additional descriptions of property protection measures are provided in Appendix A in the Regional Hazard Mitigation Plan.

C. Emergency Services

Emergency communication is a critical aspect of the hazard response programs currently in place in Groton. Emergency Services hazard mitigation measures can be combined with other types of measures to form successful projects, or remain as stand-alone projects.

The major utilities that provide service to the town follow similar procedures. Groton Utilities and Connecticut Light and Power have emergency operation centers which become operational in the event of any emergency that could impact the utilities.

The interagency communication between the town and independent utilities requires continued coordination to assure the critical communications link between the town operations and the utilities is effectively maintained. A need for improved and continued coordination has been identified during this study. Aspects of emergency services typically addressed in hazard mitigation include the following:

1. Emergency Communication
2. Flood Warning
3. Flood Response
4. Critical Facilities Protection

Town officials would like to see several improvements with emergency services for the town. The town would like to see support agencies receive improvements for radio systems and obtain adequate emergency power for the high school, which is a shelter for the Town of Groton during emergencies.

D. Structural Projects

Structural projects include utilization of the flood control strategies that have been and continue to be applied throughout Connecticut. The potential environmental impacts of structural projects are often a concern.

Structural projects that can be included in hazard mitigation planning include the following:

1. Levees/Floodwalls
2. Bridge & Culvert Replacement
3. Channel Modifications
4. Storm Sewer Improvements
5. Structural Project Maintenance and Repair

Any prospective projects which were identified during the course of assembling this plan are included in the hazard mitigation matrix in Appendix A of this annex report. Additional information on some types of structural projects is provided in Appendix A in the Regional Hazard Mitigation Plan.

E. Public Information

Public Information is another type of hazard mitigation measure which, like prevention and resource protection, can be most effectively implemented in conjunction with other hazard mitigation projects.

The Hazard Mitigation Committee has identified the need for a continued and expanded program of public information. Such a program could include providing educational information to the homeowners and business owners in the flood hazard areas. A public education and information component should be included in all hazard mitigation projects undertaken by the Town of Groton.

The following list includes some common types of public information measures:

1. Map Information

Development of hazard maps for public distribution or posting in public locations. This type of information is easily understood and assists in raising the public's awareness of the natural hazards that exist in their community.

2. Flood Audits

For additional information regarding flood audits refer to Appendix F of the Regional Hazard Mitigation Plan.

3. Real Estate Disclosure

This is a procedure where buyers and sellers of real estate are compelled to provide notice of known hazards affecting the property to be conveyed.

4. Public Library

Libraries can be an effective location of a hazard information center. Town Halls and other public facilities can also serve as information centers. A wide range of hazard mitigation documentation should be compiled for review.

5. Technical Assistance

Local governments can provide technical assistance to homeowners and contractors regarding hazard resistant construction. An appropriate time for such assistance can be at the time of a building permit application.

6. Environmental Education

Private and public schools and adult education programs can offer environmental education classes that include hazard identification and hazard mitigation components.

IV. HAZARD MITIGATION PROJECT RANKING

Based on the hazard risk assessment analysis, the Hazard Mitigation Committee has developed a matrix of several potential hazard mitigation projects recommended to reduce the Town of Groton's vulnerability to natural hazards. A matrix depicting potential hazard mitigation projects and a prioritized ranking is included in Appendix A.

Projects identified in the matrix have been prioritized based on the following criteria:

- Safety of the population
- Historical damage
- New development in high risk areas
- Value of property at risk
- Consistency with plan goals and objectives

The projects were also considered on how they relate to potential health risks, structural damage, access/egress for evacuation, and protection of structures that house people with special needs and residential areas housing a large portion of the town's population. For additional information on projects listed in the matrix and for a complete list of criteria used in the prioritization process, please refer to the text and attachments of the Regional Hazard Mitigation Plan.

V. IMPLEMENTATION, MONITORING, AND EVALUATION

The Southeastern Connecticut Council of Governments Regional Hazard Mitigation Plan and this associated community annex report were prepared with the understanding that potential funding sources may not be available within the time frame necessary to implement the recommended actions on a specific schedule. It is therefore necessary to incorporate into the plan a system of monitoring its progress and making necessary adjustments. In addition, the goals and objectives may need to be modified over time in order to meet the demands of a changing community. Accomplished activities will be eliminated, and new ones added.

The staff of the Southeastern Connecticut Council of Governments (SCCOG) serves as coordinator of the Hazard Mitigation Committee that provided oversight of the plan preparations. In accordance with § 201.6 (c)(4)(i) of the Interim Final Rule, it is recommended that the Committee meet on or before the fifth anniversary of the adoption of the plan to review the implementation progress as well as the goals, objectives, and actions outlined in the plan. With input from the Committee, SCCOG staff should prepare a report on the status of plan implementation. The report should include the following: a review of the goals and objectives of the original plan; a review of any disasters or hazards that occurred during the period; a review of each element or objective of the original plan, including what was accomplished the previous year; and recommendations for new projects or revised objectives.

FEMA also recommends that each of the local communities name a person as a local coordinator for the implementation and monitoring of the progress of the plan. This person would act as a contact for the Southeastern Connecticut Council of Governments and the State of Connecticut National Flood Insurance Program Coordinators during the grant application and cost-benefit analysis process.

APPENDIX A

HAZARD MITIGATION PROJECT LOCATION / RANKING MATRIX

APPENDIX B

HAZARD ASSESSMENT MAP

The Town of Groton Hazard Mitigation Projects

Hazard	Vulnerable Location	Mitigation Project	Priority
Flooding	Groton Long Point Road	Engineering Study of Bridge	High
Flooding	Groton-New London Airport	Roadway Elevation and Structural Protection	High
Flooding	AMTRAK Bridges at South Road and Poquonnock Road	Bridge Replacement and Drainage Improvements	High
All Hazards	Emergency Shelter	Provide Adequate Emergency Power Generator and Provide Storm Shutters Over Windows at Senior Center	High
Emergency Communication System	Emergency Operation Center	Provide Parallel Communications System	High

The Town of Groton Hazard Mitigation Projects

All Hazards	Town Wide	Evaluate the Hazard Resistant Nature of All Critical Facilities	High
Flooding	Town Wide	Develop a Flood Audit Program	High
Flooding	Town Wide	Inventory and Assessment of Flood Prone Structures and Development of Flood Audit	Medium
Flooding	Mystic	Structure Elevation and Drainage Improvements	Medium
All Hazards	Town Wide	Review of Town Transportation Facilities to Identify Critical Risks	Medium

The Town of Groton Hazard Mitigation Projects

Hazardous Materials Spills on Roadways	State Roads	Identify Appropriate Improvements to Traffic Infrastructure and Emergency Response Training and Equipment	Medium
All Hazards	Town Wide	Implement a Reverse 9-1-1 System to Automatically Call Telephones Throughout Town, Relaying Important Information During an Emergency	Low
All Hazards	Town Wide	Distribute or Post Public Information Regarding Hazards in the Town	Low

The Town of Groton Hazard Mitigation Projects

All Hazards	Town Wide	Maintain Emergency Personnel Training as well as Maintaining and Updating Emergency Equipment and Response Protocols	Low
Wind Hazards	Town Wide	Evaluate and Consider Burying Power Lines Underground and Away From Possible Tree Damage	Low
Earthquake Hazards	Town Wide	Complete an Earthquake Survey of all Critical Facilities and Infrastructures	Low

The Town of Groton Hazard Mitigation Projects

Flooding	Town Wide	1) Complete Catch Basin Surveys to Identify Catch Basins in need of Maintenance and/or Replacement 2) Complete Culvert Survey to Determine Priority for Maintenance and/or Replacement Plan	Low
Fire Hazards	Town Wide	Complete a Survey of Fire Hydrants to Assess Vulnerabilities and Capabilities for Fire Protection Dry Hydrants should be Considered as a means for Emergency Equipment	Low

The Town of Groton Hazard Mitigation Projects

Coastal Hazards	Coastal Areas	Improve Property Protection with Storm Shutters and when Possible Elevate Property above the Base Flood Elevation. Town should Consider Acquisition of Properties that are Repeatedly Flooded A Fireboat should be Considered as a Means of Emergency Equipment	Low
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