

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

**An Annex of the
Southeastern Connecticut
Council of Governments**

PREPARED FOR:

**Southeastern Connecticut
Council of Governments**

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I. INTRODUCTION

A. Setting

The City of Groton is 3.06 square miles in area and is located in the south-central portion of the southeastern Connecticut shoreline. It is bordered by the Town of Groton (of which the City is a political subdivision) to the north and east, the Thames River to the west, and Fishers Island Sound to the south. The City of Groton was established as a borough in 1903 and then incorporated as the City of Groton in 1964.

A mix of residential, commercial, and industrial development is found along the city's shoreline. The Thames River has played an important part in the development of the City of Groton. The city is well known as the home of General Dynamics - Electric Boat, a company that designs and builds submarines. Electric Boat and Pfizer, a pharmaceutical manufacturer, are the two largest employers in the city.

The City of Groton can be accessed by Interstate 95 and the Clarence B Sharp Highway (SR 349). A branch of the Providence/Worcester Railroad line enters the city from the north, heads east to the town and reenters the city from the south where it terminates at Electric Boat. Residents of the city can easily access Lawrence & Memorial Hospital in New London or the Pequot Medical Center in the Town of Groton.

The City of Groton owns and operates a municipal utility company named Groton Utilities which provides electricity and drinking water to residents in the City and throughout the region.

Fort Griswold State Park and the city-owned Washington Park, are located in the City of Groton, and are open to the public for picnics and recreational use.

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 City 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 representatives of the City of Groton on August 7, 2003 to develop a risk assessment for the city. Based on the results of this meeting and additional risk assessment research it was determined a significant hazard in the City of Groton is flooding.

The low-lying shoreline areas of the city are subject to periodic flooding by severe high tides and wave damage during hurricanes, tropical depressions, and “nor’easters”.

The low elevation of sections of the City of Groton makes it susceptible to tidal flooding. Residences are heavily concentrated along the coastline and are subject to damage from tidal flooding. Residential structures are located in low-lying areas further inland and, though not subject to damage from the surf, they may be subject to tidal flooding.

The southern portion of the city is exposed to the wave action from Fishers Island Sound. This area has experienced the most damage in the past.

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 City 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 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 policy holders within the City of Groton can qualify for a reduction in flood insurance rates.

A. Residential

The coastal areas of the City of Groton have properties that are inhabited year-round. This intensifies risk to life and property in coastal areas. 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 and due to the velocity zones located along the City of Groton's shoreline.

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

Repetitive flood insurance claims have been filed at one property in the City of Groton in the Jupiter Point Area. Jupiter Point, which is a highly populated area along the shore of Fishers Island Sound, is located to the east of Avery Point with Baker Cove bordering the eastern shoreline. Jupiter Point has many areas in the flood zone with structures that are susceptible to flooding including Pine Island Road, Jupiter Point Road, along Baker Cove, and Shennecossett Road near the intersection of Plant Street.

Eastern Point is another notable concentration of residential development in the flood zone. Roads with residential development include Shore Avenue, Tyler Avenue, and Beach Pond Road. Shore Avenue is often flooded during regular high tides. Several houses on Beach Pond Road are in the flood zone. Due to the roadway repeatedly flooding, a portion of Beach Pond Road has been elevated; however, there is still flooding in the area. A malfunctioning gate valve is suspected to be exacerbating flooding conditions in the area.

B. Commercial/Industrial

There are various scattered areas of commercial and industrial properties throughout the city that have been identified as being located within the floodplain or the coastal velocity area and are considered to be susceptible to damage.

Structures located directly on the shore of the Thames River are located in the flood zone and velocity zone and are susceptible to flooding and damage from wave action. These properties include the large industrial and office of operations of Electric Boat and Pfizer Corporation on the western side of Thames Street.

The City of Groton has initiated a design phase for a potential drainage study for the area around Electric Boat. A drainage study would be able to properly direct the flow of water into the Thames River to avoid flooding of Thames Street, Eastern Point Road, Mitchell Street, and John Street.

City officials have indicated that parking areas at the Electric Boat facility near Thames Street have been repaved without complete consideration to drainage impacts. This situation, combined with inadequate existing storm drainage system components in this area, has historically led to flooding and could pose a significant hazard during a major storm event. City officials have estimated that a fifty-inch diameter storm drainage main would be necessary in order to handle the resulting storm water discharge.

C. Critical Facilities

A review of the critical public facilities in the City of Groton indicates that the facilities are located in areas free from flooding and are generally protected from other potential hazards.

D. Transportation Corridors

The City of Groton has several major transportation routes such as Interstate 95, Route 349, Amtrak, and the Providence/Worcester Rail Line. 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. These major routes are not located in designated flood zones.

The City of Groton has identified several secondary roads in the Eastern Point and Jupiter Point areas that could potentially flood during major storms. City officials are interested in identifying alternate evacuation routes for this area during floods and other emergencies.

One such area affected by flooding is South Prospect Street, located in the Eastern Point area. The City of Groton is considering elevating South Prospect Street and building another access for the residents in the area. South Prospect Street is often flooded during regular high tides and the road becomes impassable.

Another area of concern is Avery Point, which lies to the southeast of Eastern Point. This is a busy area where the University of Connecticut's southeastern branch is located as well as a sewage treatment plant. Structures located on Avery Point are above the flood zone; however two sections of Shennecossett Road, the access way, are at risk of being impassable during a major flood event. These two sections in the flood zone could restrict emergency access to, and egress from, Avery Point during an emergency.

One roadway structure of concern near Jupiter Point and Baker Cove is the Thomas Road viaduct. Drainage structures in this area are old and in need of repair. This main thoroughfare could be compromised during a major storm event. The railroad bridge in the area is also potentially in need of repairs. Improvements in this area would be necessary in order to maintain a reliable emergency access and egress.

Flooding is a concern in the Eastern Point and Jupiter Point areas partly due because these areas are low-lying and existing drainage systems do not operate effectively. One area of concern is behind the pump station on Bayberry Lane. City officials have expressed a need to improve drainage structures in order to prevent property and roadway damage. During major storms or hurricanes these areas are also very susceptible to flooding and damage from wave action.

City officials have also expressed concern with increased thru-traffic in the City of Groton. Specifically, the City is concerned with the transportation of hazardous materials over their roadways and 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 City 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 City of Groton has planning and zoning tools in place that incorporate floodplain management. The City'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 modifications 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 requirements of the National Flood Insurance Program. Requirements include elevating structures higher than 100-year base flood elevations, 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 the 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 the City. 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 city follow similar procedures. The City of Groton is served by the municipally owned and operated City of Groton Utilities which supplies water and electric power and has emergency operation centers which become operational in the event of any emergency that could impact the utilities.

The interagency communications between the city and independent utilities requires continued coordination to assure the critical communications link between the city operations and the utilities is effectively maintained. A need for improved and continued coordination has been 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

In case of emergencies the City of Groton provides the City Municipal Building and schools located within the City as emergency shelters and maintains good communication and cooperation with the Town of Groton. The City is also involved with on-going emergency exercises for the nearby Millstone Nuclear Power Plant in Waterford.

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 City 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 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 City 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 city'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.

The City of Groton Hazard Mitigation Projects

Hazard	Vulnerable Location	Mitigation Project	Priority
Coastal Flooding	Jupiter Point	Structural Elevation, Drainage Improvements, and Culvert Replacements	High
Coastal Flooding	Eastern Point	Structural Elevation, Drainage Improvements, and Culvert Replacements	High
All Hazards	City Wide	Evaluate the Hazard Resistant Nature of All Critical Facilities	High
Stormwater Flooding	Electric Boat and Pfizer Including Thames Street and Mitchell Street	Drainage Structures and Drainage Improvements including Culvert Replacement	Medium - High
Coastal Flooding	Shennecosset Road at Avery Point	Roadway Elevation	Medium

The City of Groton Hazard Mitigation Projects

Flooding	City Wide	Inventory and Assessment of Flood Prone Structures to Develop Flood Audit	Medium
Hazard	Vulnerable Location	Mitigation Project	Priority
All Hazards	City Wide	Review of City Transportation Facilities to Identify Critical Risks	Medium
Hazardous Materials Spills on Roadways	State Roads	Identify Appropriate Improvements to Traffic Infrastructure and Emergency Response Training and Equipment	Medium
All Hazards	City Wide	Implement a Reverse 9-1-1 System to Automatically Call Telephones Throughout City, Relaying Important Information During an Emergency	Low
All Hazards	City Wide	Distribute or Post Public Information Regarding Hazards in the City	Low

The City of Groton Hazard Mitigation Projects

All Hazards	City Wide	Evaluate Emergency Shelters, Update Supplies and Check Communication Equipment	Low
All Hazards	City Wide	Maintain Emergency Personnel Training as well as Maintaining and Updating Emergency Equipment and Response Protocols	Low
Hazard	Vulnerable Location	Mitigation Project	Priority
Wind Hazards	City Wide	Evaluate and Consider Burying Power Lines Underground and Away From Possible Tree Damage	Low
Earthquake Hazards	City Wide	Complete an Earthquake Survey of all Critical Facilities and Infrastructures	Low

The City of Groton Hazard Mitigation Projects

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

The City 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. City 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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