HAZARD MITIGATION PLAN
ANNEX
FOR
NORWICH, 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

APPENDICES

I. INTRODUCTION

A. Setting

The City of Norwich is approximately 27 square miles in area. It is located in southeast Connecticut, approximately 12 miles north of the City of New London. Norwich is bordered by the Town of Sprague to the north; the Towns of Franklin and Bozrah to the west; the Towns of Lisbon and Preston to the east; and the Town of Montville to the south.

The City of Norwich is an urban community that was founded in 1659. The community has since grown to a 2000 U.S. Census population of 36,117. Residential developments are found throughout Norwich including Taftville, Norwichtown, Occum, Greenville, and Thamesville areas. West Side Walk-In Medical Center is available for residents for minor health problems and William W. Backus Hospital treats major health problems and emergencies. Windham Hospital in Willimantic is also available for residents.

The City of Norwich has a large public school system that encompasses ten elementary schools, two middle schools, one high school, and one alternative high school. Norwich Free Academy, the public high school, is funded by private sponsors and is also the location of the Slater Memorial Museum, which attracts many visitors to Norwich. Three Rivers Community College, the only college in Norwich is located in between Route 169 and Spaulding Pond.

Norwich's municipal buildings are predominantly located in the downtown area. City Hall is located on Broadway near the Superior Court building. Restaurants and shops are found throughout Norwich especially in the downtown area. Commercial development has continued to help Norwich's economy such as with the addition of Dodd Stadium, which is home to the Norwich Navigators Baseball team and the Norwich Municipal Ice-Skating Rink. Dodd Stadium draws visitors from all around the southeastern Connecticut area. Norwich Industrial Park, which is 450 acres, has allowed for many businesses to operate in Norwich including Computer Sciences Corporation, Foxwoods Resort Casino Training Center, Frito-Lay, Norwich Navigators Baseball-Dodd Stadium, and Thames Printing Company.

Major transportation corridors are important to businesses and residents in Norwich. Major roads allow access to Norwich as well as rail lines and buses. Several major transportation routes in Norwich include Interstate 395, Route 2, Route 32, Route 82, Route 12, Route 642, Route 169, and Route 97. Rail lines that travel through Norwich include the Amtrak-Providence/Worcester line and the New England Central line. The rail lines allow residents and visitors to travel from Norwich to New London and other communities throughout southeastern Connecticut and the eastern seaboard.

Three main rivers the Yantic, Shetucket, and Thames Rivers converge near the center of downtown Norwich. The Thames River allows for boats to travel from Long Island Sound to Norwich. Other bodies of water found throughout Norwich include Bog Meadow Reservoir, Wilcox Pond, Spaulding Pond, Eely Pond, Trading Cove Brook, Great Plain Brook, Ford Brook, Bobbin Mill Brook, and Goldmine Brook.

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 Norwich. 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 city officials on September 2, 2003 to develop a community risk assessment for the City of Norwich. Based on the results of the meeting and additional risk assessment research it was determined that the most significant hazard in Norwich is flooding.

The Yantic River flows into the Shetucket River in the southern portion of Norwich to form the uppermost reach of the Thames River.

The Shetucket River flows from the north along the eastern boundary of Norwich. The Shetucket River enters the Thames River at the mouth of the Yantic River. Trading Cove Brook flows from the west, along the southern boundary of Norwich. Trading Cove Brook enters the Thames River at Trading Cove, a tidal estuary south of Thamesville. Three significant dams are located on the Shetucket River at Greenville, Taftville, and Occum.

The maximum flood of record occurred in September 1938 as a result of a major hurricane moving through New England. During this flood, high water marks of 8 feet were recorded at the corner of Bath and Franklin Streets, and marks of 5.5 feet were recorded above the railroad track to Laurel Hill at the Shetucket River.

Several flood control projects that helped to protect the City of Norwich were completed between 1952 and 1965. The United States Army Corp. of Engineers constructed six flood control reservoirs in the Thames River Basin. These reservoirs control runoff from the upper watersheds of the Shetucket and Quinebaug Rivers above Norwich.

According to the City of Norwich Flood Insurance Study, a Shetucket River Channel Improvement Project was completed in January of 1959 by the United States Army Corps of Engineers. In conjunction with regular navigational dredging on the Thames River, the rock excavation and raising of the Laurel Avenue Bridge has increased the flood-carrying capacity of the lower Shetucket River.

State of Connecticut Stream Channel Encroachment Lines were adopted along the Yantic and Shetucket Rivers in Norwich to restrict building in potentially hazardous areas.

A major concern to the city officials and residents of Norwich is flooding along the Yantic River. There is a long history of flooding along the Yantic River. According to the Yantic River Hazard Mitigation Plan, completed by the City of Norwich in 2000, there are approximately 190 properties within the flood zone of the Yantic River, 161 of these properties are developed. According to the plan the following flooding events have occurred in the past ten years:

- January, 1994: ice jam followed by a quick thaw caused minor flooding at numerous locations along the Yantic River.

- April, 1996: minor flooding of the Yantic Village and Falls Mills (Yantic Street) areas.

- March, 1998: flood height measured at slightly more than 11 feet (a 10-year event).

- February, 1999: flood height measured at nearly 9 feet (a 2-year event).

Flood mitigation projects continue to be planned to lessen the impact of any future flooding along the Yantic River. A few examples of flood mitigation projects that have been considered include:

- Construction of a ring dike around Yantic Flats shopping center, near West Town Street.

- Construction of two dikes on the north side of Norwich-New London Turnpike.

- Construction of a dike on West Washington Street in the vicinity of the Norwichtown Mall.

A Flood Audit was completed along the Yantic River by the Natural Resources Conservation Service. No formalized program is currently in place to identify all the locations or number of structures that are susceptible to flooding along the other watercourses in the City. 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. The completion of a Flood Audit would be an important step in the National Flood Insurance Program Community Rating System by which the City of Norwich can qualify for a reduction in flood insurance rates.

A. Residential

A review of the City of Norwich Flood Insurance Rate Maps, topographic maps, and aerial photographs, reveals residential structures which are subject to flooding along the Yantic, Shetucket, and Thames Rivers.

Repetitive flood insurance claims have been filed at more than 18 properties in the City of Norwich over the past twenty-five years. These repeat claims demonstrate the serious nature of the flood hazards in the City of Norwich.

There are many residential structures throughout the City of Norwich that may be susceptible to flood damage. The majority of these structures are located in the floodplains of the Yantic River, Shetucket River, Trading Cove Brook, and Thames River. A listing of the areas at risk and the associated floodplains is as follows:

Structures at Risk Along the Yantic River:

Yantic River
Franklin Road
Sunnyside Street
West Town Street
Connecticut Avenue
Wawecus Street
Clinton Avenue
Pleasant Street
Elm Avenue
Capehart Drive

Rollins Road
Matlock Road
Sherman Street
Falls Avenue
Mail Road
Shetucket Street

Norwichtown Brook
Case Street
West Town Street
Sholes Avenue
Woodrow Avenue
Sturtevant Street.

Structures at Risk Along the Shetucket River

Shetucket River
Main Street
Norwich Avenue
Boswell Avenue
North Main Street.

Hunter Brook
Hunters Road

Structures at Risk Along Trading Cove Brook

Trading Cove Brook
Shore Road
New London Turnpike
Montville Road

Goldmine Brook
Salem Turnpike

Ford Brook
Old Salem Road
Salem Turnpike.

Structures at Risk Along the Thames River

Thames River
Rose Street
South Street

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. These areas in the potential flood zone are principally threatened by the Yantic River:

West Town Street
A gas pipeline facility owned by the Algonquin Transmission Company

Clinton Avenue
Mix of commercial buildings
Old industrial building

Franklin Road
A tavern and several commercial buildings near the Yantic Village Fire Station

Pleasant Street & Sturtevant Street
Shop-Rite Plaza

Town Street
Norwichtown Mall - (the structure has been flood proofed)

Rolllins Road
Electrical substation

Connecticut Avenue
Electrical substation

Wawecus Street
Phelps-Dodge Industrial Plant - access way may restrict vehicle access to the facility.

C. Critical Facilities

The majority of the City of Norwich's critical public facilities are not located in flood hazard areas. However, one area of concern is the Yantic Village Fire Station. The fire station is within the flood zone and has been flooded frequently in the past. A serious concern to city officials is the possibility of floodwaters blocking access to and from the Fire Station for emergency vehicles.

Another public facility in the flood zone is the city's Department of Public Works offices and garage. This facility is located on the north side of Clinton Avenue and is susceptible to flood damage.

D. Transportation Corridors

The City of Norwich has several transportation routes, including Interstate 395 and Routes 2 and 32 and two rail lines; the New England Central line and the Providence and Worcester line. A series of crossings of the railroads and the highways have been constructed to allow passage of roadways under and over the highways and railroads.

The New England Central rail line parallels the Yantic and Thames Rivers on its path through Norwich. Although portions of the line are within the flood zone, the rail bed is elevated in many places and creates a dike effect, cutting off flood waters.

Flooding is a concern for many roadways throughout Norwich. The potential flooding may affect emergency response. The following roads are susceptible to flooding during severe storms:

Roadways at Risk of Flooding:

Yantic River
New London Turnpike Bridge
Sherman Street Bridge
West Main Street

Several flooding sources in Norwich, including Bobbin Mill Brook, Spaulding Pond Brook, Ford Brook, and Great Plain Brook have culverts that have insufficient capacity for water to flow through them during major storms. As a result, water backs up and may potentially flood the roads near these culverts. The following is a list of problem areas for each main drainage basin.

Culverts Along the Yantic River:

Bobbin Mill Brook:
Town Street
East Town Street
Scotland Road

Culverts Along the Shetucket River:

Spaulding Pond Brook
State Route 32 (Main Street)
Bath Street
Willow Street
Chestnut Avenue
Lake Street
Broad Street
Hickory Street
East Baltic Street
Mohegan Park Road No. 2

Culverts Along Trading Cove Brook:

Ford Brook
New London Turnpike
School Driveway
Newton Street

Great Plains Brook
Village Court
New London Turnpike
Melrose Park Road

City officials have also expressed concern with increased thru-traffic in Norwich. 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 Norwich.

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 Norwich has planning and zoning tools in place that incorporate floodplain management. According to the Yantic River Hazard Mitigation Plan, the City of Norwich has included floodplain regulations in its zoning ordinance since January, 1991. Regulations covering development in inland wetland areas have been in existence since July 1974 and enforced by the City's Inland Wetlands, Watercourses and Conservation Commission. A 1970 flood prevention plan, written by the Soil Conservation Service and the U.S. Department of Agriculture and sponsored by the Connecticut Department of Environmental Protection (CTDEP) recommended the construction of two flood control dams upstream in the Town of Lebanon. However, strong opposition within the Town of Lebanon prevented this plan from reaching completion.

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 requirements 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 City of Norwich has used property protection mitigation measures in several situations. An example of Norwich's property protection is how the State of Connecticut acquired and demolished twelve residences within the Yantic River's flood zone. Part of the acquisition occurred at the intersection of Clinton Avenue and Wawecus Street. This area of vacant land will remain as open space for the City of Norwich.

Another example of property protection is the Norwichtown Mall. The Norwich Commission on the city plan required the Norwichtown Mall to erect a 4-foot high concrete floodproofing reinforcement abutting the entire perimeter of its exterior walls. Also, the State rebuilt the streambank on both sides of the Yantic River with rip-rap where the Yantic River crosses through the Norwichtown Mall property.

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 Norwich. 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 Connecticut Light and Power company has emergency operation centers which become operational in the event of any emergency that could impact the utilities.

The interagency communication 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 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

City officials have expressed a critical need for a reverse 9-1-1 emergency communication system that is voice capable of notifying the public of emergencies.

City officials have also expressed concern with emergency services related to diseases such as the West Nile Virus.

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.

With regard to stormwater drainage, the City Department of Public Works pursues a policy of zero percent increase in stormwater runoff when reviewing major development projects within the watershed, but this policy is not written.

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 Norwich.

The following list includes some common types of Public Information measures:

1. <u>Map Information</u>

   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 hazard mitigation projects recommended to reduce the City of Norwich'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 Norwich Hazard Mitigation Projects			
Hazard	**Vulnerable Location**	**Mitigation Project**	**Priority**
Flooding	City Wide	Culvert Engineering Study to Identify Undersized Structures	High
Flooding	Yantic Village Fire Station	Relocation or Building Elevation	High
Flooding	Department of Public Works	Relocation, Building Elevation, Floodproofing	High
All Hazards	City Wide	Evaluate the Hazard Resistant Nature of All Critical Facilities	High
All Hazards	City Wide	Comprehensive Evaluation of Emergency Communication Capabilities Throughout City	High

The City of Norwich Hazard Mitigation Projects			
Flooding	City Wide (Other than Yantic River)	Flood Audit Program	Medium
Hazard	**Vulnerable Location**	**Mitigation Project**	**Priority**
Flooding	City Wide	Property Acquisition Along Yantic River	Medium
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

The City of Norwich Hazard Mitigation Projects			
All Hazards	City Wide	Distribute or Post Public Information Regarding Hazards in the City	Low
All Hazards	City Wide	Evaluate Emergency Shelters, Update Supplies and Check Communication Equipment	Low
Hazard	**Vulnerable Location**	**Mitigation Project**	**Priority**
All Hazards	City Wide	Maintain Emergency Personnel Training as well as Maintaining and Updating Emergency Equipment and Response Protocols	Low
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 Norwich Hazard Mitigation Projects			
Flooding	City 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
Hazard	**Vulnerable Location**	**Mitigation Project**	**Priority**
Fire Hazards	City 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