
Appendix B

Enfield Flood Hazard Mitigation Plan

TABLE OF CONTENTS

INTRODUCTION

Purpose
Authority
Scope/Overview

COMMUNITY DESCRIPTION

Geographical
Cultural
Population Distribution and Change
Development Trends
Governmental Structure

FLOOD HAZARDS

History
Vulnerability Assessment
Freshwater and Jawbuck Brook
Waterworks and Grape Brook
Scantic River
Beemans Brook
Existing Mitigation
Regulatory Mitigation
Corrective Mitigation
Capabilities and Resources
Objectives and Actions
Implementation

PROGRESS MONITORING

TECHNICAL AND FINANCIAL RESOURCES

REFERENCES

List of Figures:

Figure 1 – Town of Enfield Waterbodies and Streets
Figure 2 – Enfield Population Change by Census Tract
Figure 3 – Federal Emergency Management Agency Flood Boundaries

List of Tables:

Table 1 – Completed Flood Hazard Mitigation Structural Projects
Table 2 – Completed and Ongoing Flood Hazard Mitigation Projects
Table 3 – Planned Flood Hazard Mitigation Projects

THE TOWN OF ENFIELD FLOOD HAZARD MITIGATION PLAN

I. INTRODUCTION

A. Purpose

The purpose of a Flood Hazard Mitigation Plan (FHMP) is to assist the community in identifying localized flood prone areas, flood hazards and risks, and measures that can be undertaken by the community to prevent the loss of life and reduce property damages associated with floods (Federal Emergency Management Agency (FEMA), 1979). An effective plan is an informative compilation of local flood data and known hazards that outlines strategies for minimizing the likelihood of flood damage, and offers a plan to most efficiently and effectively offset losses.

The Town of Enfield has several structural and regulatory flood mitigation tactics currently in place. However, there are several water bodies that have been identified within the Town of Enfield as potential flood hazards. Beemans Brook, Waterworks Brook, Grape Brook, Freshwater Brook, Jawbuck Brook, Shaker Lake, Terry Brook, Boweys Brook, Buckhorn Brook, and the Connecticut River are some of the major watercourses within Enfield which are depicted in *Figure 1*. Several of these watercourses have been researched for their previous flooding history and their current flooding potential. There are certain areas within the Town of Enfield that have

been repeatedly inundated by rainstorms and mitigation has been or is scheduled to be completed. Mitigation strategies and activities are listed within the Flood Hazard Mitigation Plan to assist in reducing damages caused from flooding.

B. Authority

This plan was authorized under Section 553 of the National Flood Insurance Reform Act of 1994. Section 553 gives the authority to create a Flood Mitigation Assistance Program, which provides grants to communities for planning assistance. The Town of Enfield has received a Flood Mitigation Assistance Planning Grant from the State of Connecticut Department of Environmental Protection (DEP) to develop a municipal FHMP. The Town of Enfield has entered into an agreement with the DEP to prepare the FHMP in full compliance with all regulations and requirements of the National Flood Insurance Program (NFIP) 44 CFR Subchapter B; and the Flood Mitigation Assistance Program.

C. Scope/Overview

The Enfield Flood Hazard Mitigation Plan examines past and predicted flooding trends within the boundaries of the Town of Enfield. Although flooding has been recorded in neighboring towns, this Plan focuses solely on mitigating flooding in Enfield.

II. COMMUNITY DESCRIPTION

A. Geographical

The Town of Enfield is a suburb located in Hartford County, North Central Connecticut, 18 miles north of Hartford and eight miles

south of Springfield, Massachusetts (Town of Enfield, 1993). Enfield is at the center of a two-state, three-county region. The town is 33.8 square miles with a population of approximately 46,010 people. There are 1.2 million people within a 15-mile radius and the town's population-density is 1270.57 people per square mile (Town of Enfield, 1999b).

The Town of Enfield's infrastructure has more than 170 miles of town roads, plus Connecticut and U.S. highways, which are depicted in *Figure 1*. Bradley International Airport is eight miles south of Enfield and Interstate-91 connects Enfield with I-84 to the south and I-90 to the north. Boston and New York are located two hours away (Town of Enfield, 2000a).

The climate in Enfield is typical of an inland valley. The summers are moderately warm with average daily temperatures of 71.1^o F, while winters are cool with an average temperature equaling 27.3^o F. Annually, the average precipitation is approximately 44 inches, which is evenly distributed throughout the year (Town of Enfield, 2000a).

B. Cultural

Current and past land use and cultural trends are important factors in determining a town's previous and existing flood hazards. Development practices should incorporate structural and regulatory mitigation practices as growth occurs. Mitigation practices will be discussed in existing mitigation section.

Enfield was named and incorporated by the Commonwealth of Massachusetts in 1638 and annexed to Connecticut in 1749 (Town of Enfield, 2000a).

The first group of individuals to call Enfield home, were farmers of European descent.

These residents settled in Enfield around 1680 to reap the benefits of growing shade-grown tobacco in the fertile soil of the area. From the late 1700's until the 1860's the population of Enfield consisted of a community of Shakers (Town of Enfield Conservation Committee, Capital Region Council of Governments, The Enfield Planning and Community Development Department, 1999).

The nineteenth-century entrepreneurs built manufacturing plants, ironworks, gristmills and a gin distillery along the riverbanks. The 1950's and 1960's saw a doubling in the population of Enfield as well as the completion of I-91 in the mid-1950s which brought new businesses into Enfield (Town of Enfield, 2000a).

Today there are more than 1,660 businesses in Enfield. The main sources of employment in Enfield currently are trade, manufacturing and services. Trade constitutes 39.5% of the employment sector, while manufacturing and services make up 19.7% and 19.3% respectively. The additional sectors of employment in Enfield consist of government (9.5%); construction (5.7%); financial, insurance, real estate (3.7%); and transportation and utilities (2.3%). Growing tobacco for cigars still continues, although only 0.3% of Enfield's current employment sector is agriculture. Total retail sales average \$325 million annually (Town of Enfield, 2000a).

C. Population Distribution and Change

Over the 40-year period from 1950 to 1990, Enfield's population increased 66.0%, from 15,464 people to 45,532 people. Studies conducted by the Connecticut Capitol Region Growth Council reveal that the number of residents living in the Town of Enfield increased 6.2% from 1980 to 1990 with a population change from 42,695 to 45,532. The projected rate for the year 2020 anticipates an

increase in population to reach a total of 47,830 residents (Town of Enfield, 2000). Population growth has directly related to an increase in development in Enfield, which in turn affects the Town's flooding potential. The addition of impervious areas from roads, houses and industrial buildings leads to a decrease in the absorption of stormwater. Less absorption causes an increase in the amount of stormwater entering the waterways through drainage systems that outlet directly into existing water bodies.

There are five higher-density population areas within the Town of Enfield. These areas include North Thompsonville to the north, Hazardville in the geographical center, Scitico in the east, Thompsonville in the west, and Enfield in the southwestern portion of the Town. The Town of Enfield is primarily a residential town, but has seen a rapid increase in commercial and industrial land uses. Manufacturing industries are localized in North Thompsonville, the Moody Road area, the Bacon Road area, and the Enfield Memorial Industrial Park along I-91. There are several commercial properties with shopping malls within the Town (Connecticut Capitol Region Growth Council, 2000).

Figure 2, "Population Change by Census Tract", outlines the areas in which Enfield is experiencing population changes. This attachment shows a comparison of 1980 and 1990 population by census tract. Areas in the northwest and southwest portion of the Town show very slight increases or decreases in population growth. The southeast corner of the Town shows a growth of 26.7%. The center, northeast portion of town also demonstrates growth of 36.5%. The largest amount of growth, 220.9% between the years of 1980 and 1990, was seen in the upper northeast corner with the addition of a prison. (Town of Enfield, 2000a).

D. Development

In the early 1900's, Enfield was a rural agricultural town with urban development restricted to Thompsonville, Hazardville, and Scitico. The addition of new highways in the 1950's and 1960's led to economic expansion and the urban area of Enfield spread into additional sections of the community.

The first Enfield Plan of Conservation and Development was adopted in 1965 to define a future land use strategy. Industrial parks and regional shopping areas were believed to be important to broaden the community's economic base and grand list. A land use plan was developed which proposed the conservation and revitalization of the historic urban centers at Thompsonville and Hazardville. The plan encompassed a goal to expand the community economic base by promoting development of a bank of industrial lands adjacent to I-91, along with the development of another major industrial area in the town's northeast corner. Retail development would be focused adjacent to I-91 between Routes 220 and 190. The balance of the community would be predominantly residential, with some spot locations of commercial or industrial use to satisfy specific needs and established conditions (Town of Enfield, 1999b).

This plan also proposed open space reserves along the Scantic River and the Connecticut River to protect the Town's waterways. Greenways of narrower dimension were added to the plan along Freshwater Brook.

When the 1965 Plan of Development was updated with the Plan of Conservation and Development in 1987, land use statistics developed, showed a diversification of Enfield's development. About 50% of the area in Enfield was developed in 1987 with 8,660 acres developed as residential, 680 acres

developed commercial and 1,140 acres developed industrial (Town of Enfield, 1999b).

Since the 1987 Plan there has been steady development in all principal land use categories. There have been some changes in zoning classification, but in the general categories used for 1987, there are now about 11,330 acres developed as residential, 720 acres developed as commercial and 1,895 acres developed as industrial. Total developed area has increased from 50% to 68% of the Town, a difference of about 3,470 acres (Town of Enfield, 1999b).

Land use within this area includes residential and commercial districts, wooded areas, and farmland. The residential areas are primarily single-family housing with some multi-family complexes. Schools, retail stores, and small industrial enterprises are common within the commercial areas. Farm crops include tobacco, ornamental plants and vegetables (Town of Enfield, 1999b).

Water is primarily provided by two water companies: the Connecticut Water Company and the Hazardville Water company. These two water companies provide water to approximately 41,000 residents. A third, privately-owned water company, that draws its water from a private well, is the Shaker Heights Water Company, located behind a residential area on Pine Hill Road. This water company serves approximately 50 households on Pine Hill Road, Lake Road, and Westview Drive. The remaining public water system is composed of deep private wells. There are no reservoirs feeding the system and there are six above ground water tanks with a total capacity of four million gallons (Town of Enfield, 1993).

A municipal sewer system is utilized by 90% of the residents of Enfield. The remaining 10% use private septic systems. Located on 90 Parsons Road is a secondary sewer treatment plant (Town of Enfield, 1993).

E. Government Structure

A Charter, adopted in 1962 established Enfield's Town Council and Council-Manager form of government. The Town Manager of Enfield has direct control over all Town departments, agencies and offices and therefore oversees and has ultimate responsibility for implementation of a flood hazard mitigation strategy. This authority is limited only by the Governor of the State of Connecticut in State-declared emergencies or the President of the United States of America in nationally-declared emergencies (Town of Enfield, 1993).

The Planning Department advises the Town Council, the Town Manager, and all other Town departments, as well as the Planning and Zoning Commission and the Zoning Board of Appeals, concerning all planning and development within the community (Town of Enfield, 1999a). The Town Planner's Office coordinates weekly reviews of proposed projects and also the administration of the wetland regulations.

The Planning and Zoning Commission is important in flood hazard mitigation because they, operating under the authority set forth in the General Statutes, regulate the development of land in Enfield. This Commission also is responsible for the establishment of a Plan of Development, which determines a long-range planning policy as well as specific objectives.

The Department of Emergency Management is comprised of a Director of Emergency Management (who is also the Assistant Town Manager), and an Emergency Management Assistant (Vindigni, 2000). The Department of Emergency Management addresses any flooding issues primarily in the response/recovery mode by interacting with the various agencies such as police, fire, public

works, and any State or Federal agencies. This office is also responsible for developing and updating the local emergency response plan, which would serve as an operational guideline to agencies during significant emergencies, such as a flood (Town of Enfield, 1993).

The Emergency Management Department has recently participated in improvement efforts on two specific occasions. These efforts include two FEMA grants. The first grant is for drainage work at Beemans Brook and the second is for a pending application to the Connecticut Department of Environmental Protection (DEP) for FEMA funds to relocate a resident's home that has a long history of flooding and damages paid under National Flood Insurance Policy (NFIP).

The Public Works Administration is responsible for the oversight of the Capital Improvement Program's projects, as well as several divisions that are involved in flood hazard mitigation. The Capital Improvement Program is a comprehensive list of public improvement projects, which are proposed for the Town over the course of the following six years. Each year the Capital Improvement Program is reviewed and extended another year, thus maintaining a constant six-year program. The annual review of the programs allows the Town to adapt to changing circumstances, and also modify plans and priorities, as needed (Town of Enfield, 1999a).

Other divisions of the Public Works Administration include Parks and Recreation, Highway Maintenance Engineering, Solid Waste Collection and Disposal, Building Inspection, Building Maintenance, and Water Pollution Control (Town of Enfield, 1999a).

Highway Maintenance and Solid Waste Collection and Disposal are important in maintaining the local drainage system and highway and street clean up programs that are

regularly completed. These programs assist in the removal of sand and debris that would otherwise collect and block drainage structures.

The Building Inspection and Building Maintenance Divisions are responsible for the enforcement of building codes set by the Council of American Building Officials (Council of American Building Officials One and Two Family Dwelling Code, 1995) and by the Building Officials and Code Administrators (Building Officials and Code Administrators National Building Code, 1996). Specific construction policies are denoted within these building codes concerning flood mitigation.

The Engineering Division is responsible for reviewing and inspecting all site plans submitted to the Planning and Zoning Commission. The division provides minor design and technical support to various divisions of the Public Works Department. The Engineering Division works in close contact with the Connecticut Department of Transportation (DOT) to maintain relations concerning State funded local highway projects, design and construction. This is important in well-designed and effective construction of flood reduction projects such as the installation of adequate drainage and retention/detention systems (Town of Enfield, 1999a)

Together the Public Works Administration and Engineering Division are responsible for all infrastructure improvements associated with drainage. They participate in administrative review sessions on proposed projects by public agencies and private developers.

Presently, the Public Works Administration, the Inland and Wetlands Commission, and the Engineering Division are the most active participants regarding flood mitigation efforts. The Planning and Zoning

Department interacts with the wetland regulations on any development proposals; however, the Department of Public Works and the Department of Engineering interact at an in depth level when dealing with issues concerning drainage and flooding impacts upon infrastructure, and private property. The Engineering Department also has the responsibility of overseeing the NFIP maps issued for the Town of Enfield.

The Community Development Office administers all grant funds awarded to the Town. This department provides technical support to various town organizations important in flood mitigation, including the Enfield Revitalization Committee and the Clean Sweep Committee (Town of Enfield, 1999a). Additionally, the Enfield Revitalization Committee, which is associated primarily with the Community Development Office, has adopted a "Village Center Zone" for Thompsonville that requires Enfield Revitalization to comment on any developments within the zone.

The Community Development Office and the Public Works Administration are involved in the recent completion of two technical studies designed to determine the possibility of a future sediment dredging of Freshwater Pond (Baystate Environmental, 1999).

The Town Attorney plays an important role if hazard mitigation with their involvement in the review of any contracts with State and Federal agencies, concerning wetland regulations. The Town Attorney would be involved if there is violation of the wetlands' regulations that requires an extended enforcement effort, property takings, or obtaining easements to conduct drainage improvements. The actions of the Town Attorney are done in corporation with the Public Works Administration, Engineering Division, and Planning and Zoning Commission.

Enfield's Flood and Erosion Control consists of the members of the Town Council. The Town Council will appoint a liaison from the following departments: town manager, public works, planning, and community development (Town of Enfield, 1997). The Board has all of the powers granted in the Connecticut General Statutes Sections 25-84 through 25-94, which denotes specifics for issues dealing with municipal flood and erosion control. The purpose of this board is to plan, layout, acquire, construct, reconstruct, repair, maintain, supervise, and manage a flood and erosion control system (Town of Enfield, 1994).

The Inland Wetlands and Watercourses Agency of the Town of Enfield was established in accordance with Section 2-48 of the Town of Enfield Town Ordinance and is authorized to implement the purposes and provision of the Inland Wetlands and Watercourses Act in the Town of Enfield. The Town of Enfield Inland Wetlands and Watercourses Agency issue, modify or deny permits associated with regulated activities on inland wetlands, watercourses, and the surrounding regulated areas (Town of Enfield, 1993).

An additional agency that may influence flood hazard mitigation is the Economic Development Agency. This office conducts programs, services, and activities aimed at business recruitment, attraction, and expansion. The Economic Development Agency oversees the industrial park between Route 190 and South Road, which is important in the mitigation of flooding in the area. Recent mitigation projects have been completed within this area to reduce the possibility of flooding.

The Town of Enfield Conservation Committee, the Capitol Region Council of Governments, and the Enfield Planning Department and Community Development

Department are currently involved in a joint effort, now in its early planning stages, to preserve the open space and farmland within the Town of Enfield. One goal of this coalition is to preserve the floodplains and natural drainage areas of Enfield by identifying key flooding sites where there are no existing development. Potential flooding impacts would be considered in the development review process (Town of Enfield Conservation Committee, 1999).

Connecticut River Assembly has developed standards that promote public health, safety and general welfare through minimizing flood losses in flood plain areas, as well as to encourage flood plain use. The Capitol Region Council of Governments and the Connecticut River Assembly are non-profit organizations that receive funding through the Town of Enfield. All of these different agencies provide a network to manage issues dealing with flood hazard mitigation (Town of Enfield, 1999a).

III. FLOOD HAZARDS

A. History

Every year flooding is reported throughout Connecticut as small streams and rivers flood due to heavy rainfall. Flooding can result from inadequate or blocked drainage systems. Bridges and dams can collapse during severe flooding episodes, as they did in Connecticut in the floods of 1955 and 1982. Fallen debris, including branches and uprooted trees, can block small bridges and culverts causing streams and ponds to overflow. Houses located within areas of flood concern are susceptible to flooding, causing property damage and hazardous conditions for humans (Natural Resource Center, 1983). Annually, flooding causes more property damage in the

United States than any other type of natural disaster (FEMA, 1986).

FEMA is an independent agency of the federal government, reporting to the President (FEMA, 2000a). FEMA was founded in 1979 with the mission to reduce loss of life and property and protect our nation's critical infrastructure from all types of hazards through a comprehensive, risk-based, emergency management program of mitigation, preparedness, response and recovery (FEMA, 2000c). Prior to FEMA, there were several fragmented organizations that were responsible for emergency and disaster activities. The creation of FEMA led to the absorption of these agencies including the Federal Insurance Administration, the National Fire Prevention and Control Administration, the National Weather Service Community Preparedness Program, the Federal Preparedness Agency of the General Services Administration and the Federal Disaster Assistance Administration (FEMA, 2000c).

The *Flood Insurance Study*, published by FEMA, in September of 1979 provides flood information on Enfield. The *Flood Insurance Rate Maps* and the *Flood Boundary and Floodway Maps* reflect information reported in the *Flood Insurance Study* and provide detailed information on areas within Enfield that are vulnerable to flooding. These maps were last updated in March 28, 1980. (FEMA, 1979).

The flood hazard data in the *Flood Insurance Study* was determined utilizing standard hydrologic and hydraulic study methods. The maps within this study show areas of flood concern by delineating them into 100-year and 500-year flood zones. These flood zones have a 1 and 0.2 percent chance respectively, of being equaled or exceeded during any given year (Alexander Law Firm, 1996).

The long-term average periods between floods of a specific magnitude is denoted by recurrence intervals. This system is only a guideline and rare floods could occur within shorter intervals or even within the same year (FEMA, 1979).

A 100-year flood is the accepted standard that is used by the National Flood Insurance Program (NFIP) as the basis for insurance requirements. The NFIP is a federal program that allows, and sometimes requires, property owners to buy insurance to protect themselves against losses caused from flooding. This insurance is a policy alternative to disaster assistance.

Participation in the NFIP is based on an agreement between local communities and the federal government. This agreement's underlying goal is to encourage communities to implement and enforce measures to reduce future flood risks to new construction in special flood hazard areas. If the community succeeds in this then the federal government will make flood insurance available within the community as a financial protection against flood losses that do occur (Alexander Law Firm, 1996).

Figure 3, FEMA Flood Boundaries, outlines 100-year and 500-year flood zones for the Town of Enfield. The A-Zones (100-year flood zone) are areas in which detailed hydraulic analyses have not been performed and floodplain delineations are approximated (FEMA, 2000e). AE-Zone (100-year flood zone) are areas in which detailed hydraulic analyses have been completed (FEMA, 2000d). Flood insurance is required for property owners in both of these flood zones. FEMA flood zone, X500, denotes areas of moderate or minimal hazard from principal sources of flooding as identified in the community. The Town of Enfield is located in Hartford County, Connecticut and is in the Connecticut River Watershed. The town's western boundary is the Connecticut River and its northern boundary borders Massachusetts. There are several water bodies identified within the Town of Enfield as having the potential to flood; these include Freshwater

There are several additional studies that were done to assess flood hazards in Enfield.

In 1996, the Natural Resource Conservation Service completed two separate hydrology and hydraulics reports; the *Freshwater and Jawbuck Brook Watersheds Floodplain Management Study* and the *Waterworks and Grape Brook Watersheds Floodplain Management Study*, which identified each watershed's flood issues. *Scantic River Watershed Preliminary Design Assessment of Critically Eroding Areas*, completed in 1995 by the Natural Resource Conservation Service, specifically on the land degradation of the river area. The *Freshwater Pond Watershed Study* evaluating the watershed and the eutrophication issues was completed in December 1999. Another project on Freshwater Pond, *Dredging Feasibility Report*, was also completed in December of 1999.

From 1980 to 1984 a rain gauge was operated at Higgins School in Enfield. This gauge was used for all flood reporting during this time. Any years prior to 1980 or after 1984 utilized the closest gauge, which is located at Bradley International Airport. Several large storms have been recorded using either of these two gauges, including storms in 1955, 1982, 1989, 1991 and 1996. The maximum flood record in Enfield occurred in August 1955 when a hurricane produced 15.45

inches of rainfall in 47 hours. Other recent storms occurred in May 1989, 4.81 inches in 17 hours; and August 1991, 4.05 inches in 16 hours. A storm on April 16, 1996 produced 2.2 inches in 14 hours (USDA, 1996a).

The Town of Enfield is located in Hartford County, Connecticut and is in the Connecticut River Watershed. The town's western boundary is the Connecticut River and its northern boundary borders Massachusetts. There are several water bodies identified within the Town of Enfield as having the potential to flood; these include Freshwater

Brook, Jawbuck Brook and Shaker Lake, Waterworks Brook, Grape Brook, Beemans Brook, and the Scantic River. These water bodies are located in the Connecticut Main Stem Regional Basin (USDA, 1996b).

Both the Freshwater Brook and its tributary, Jawbuck Brook, have been evaluated for flooding. Freshwater Brook enters the town in its northeast corner, flows from northeast to southeast, and outlets into the Connecticut River. Jawbuck Brook is located to the northwest of Freshwater Brook and joins Freshwater Brook upstream of Elm Street. Several major roadways, such as I-91 and U.S. Route 5, bisect the Freshwater Brook Watershed. The Freshwater Brook Watershed has a drainage area of 7,050 acres. The Jawbuck Brook is included within this watershed and makes up 1,680 acres of the drainage area (USDA, 1996a).

Waterworks Brook is located in the northwest corner of the town. The brook drains from east to west into the Connecticut River. The Waterworks Brook Watershed is divided in half by several major roadways. I-91; U.S. Route 5; and the Amtrak rail line, between I-91 and the Connecticut River, all bisect this watershed. Grape Brook runs south of Waterworks Brook and joins Waterworks Brook just upstream from the railroad crossing. The two watersheds in this area have a drainage area of 2941 acres. Waterworks Brook Watershed makes up 1104 acres of this area. Grape Brook Watershed has a slightly larger drainage area equaling 1837 acres (USDA, 1996b).

Beemans Brook watershed is located within the southwest corner of the Town of Enfield. Beemans Brook discharges directly to the east side of the Connecticut River. A portion of this watershed is available for future development. Beemans Brook has a drainage area of approximately 2.8 square miles. Residential housing is located along the

corridor of a tributary of Beemans Brook, which travels from the northern portion of the watershed, through a residential corridor to its junction with Beemans Brook. From this tributary's headwaters, to the junction of Beemans Brook, there are four road crossings that intercept the tributary. Some channel improvement work was completed in 1986 by the Town in the upper reach of the tributary from Bridge Street to a wood area approximately 300 feet downstream of the road (USDA, 1989).

The Scantic River watershed is located within the southeast corner of the Town of Enfield and flows into the Connecticut River. The Scantic River flows west, is intercepted by Route 191, and then continues south where Buckhorn Brook extends off in a northeastern direction. Figure 2 delineates the major waterbodies and streets within the Town of Enfield.

There are five dams located in Enfield: the Enfield Dam, which is situated on the Connecticut River, Scitico Dam, Freshwater Pond Dam, Shaker Pines Lake Dam, and Crescent Lake Dam. Enfield is affected by the Somersville Dam, located in Somersville, an adjacent community to the East, during flooding conditions (Town of Enfield, 1993).

B. Vulnerability Assessment

Overall, flooding problems in the Town of Enfield have occurred most often along the Connecticut River, Freshwater Brook and Jawbuck Brook. In the past, Waterworks or Grape Brooks have not been substantially impacted by the more notable rainstorms and have not usually produced localized flooding. The August 1955 hurricane caused flooding mostly along the banks of the Connecticut River (Waterworks and Grape Brook, 15). Cottage Road, Lynch Terrace, O'Hear Avenue, and Meadow Lark Road are examples of a few

streets, within the Town of Enfield, that have been repeatedly inundated by rainstorms. The following section gives a history of the known flooding problems associated with each waterway.

1. Freshwater and Jawbuck Brooks

In August 1955, the maximum flood record on Freshwater and Jawbuck Brooks was recorded. During this storm it was reported that the water flowed 2 feet deep over the Enfield Street (Route 5) bridge. Additionally, during the 1955 storm, the north side of Fresh Water Pond Dam was cracked, allowing water to flow down Main Street. On Enfield St. the estimated maximum discharge during this flood was 3,800 cubic feet per second (cfs). In the past flooding was frequently recorded at and downstream of Shaker Pines Lake. Shaker Pines Lake rose 3 feet above the spillway crest during the 1955 storm. The increase in the amount of water in the lake caused water to flow over Cottage Road (USDA, 1996a).

A storm in 1996 caused flooding at Cranbrook Boulevard and water flow over the road was reported. Local Enfield residents have reported concerns of flooding at Freshwater Drive, at G. Fox Drive and parking areas in the Enfield Square Mall, and at houses at the end of Lynch Terrace and O'Hear Avenue (USDA, 1996a).

The Town of Enfield and the State of Connecticut specifies building standards for design of highway culverts and bridges. All main roads and subdivision roads within the Town must be designed for 50-year storm protection. Major highways, such as Route 5 and I-91, are regulated by State requirements, which mandate 100-year storm protection (USDA, 1996a). The Town of Enfield's standards for design of highway culverts and bridges calls for 25-year storm protection for its major highways (USDA, 1996b).

Flood studies done on Freshwater Brook have demonstrated that there is a possibility that the brook could cause flooding in several of the surrounding areas. The flood plain management study has data that predicts future flooding on:

Route 5 (Enfield St.);
the I-91 access ramp; and
specific secondary and residential roads such as Bacon Road, Palomba Drive, G Fox Drive, and Elm Street.

All of the above-mentioned roads will be overtopped during the 50-year storm except Elm Street, which will flood in a 100-year storm (USDA, 1996a).

The potential for residential flooding exists in this watershed just downstream from I-91. Approximately 10 residences, which are located on both sides of the stream at the ends of Lynch Terrace, O'Hear Avenue, and John Street are predicted to be impacted by flood waters during storms ranging from the 25-year to 100-year storm (USDA, 1996a).

Problem areas in Jawbuck Brook include uncertainty with the water surface profile that demonstrates that certain secondary and residential roads have varying flooding potential including: Cottage Road, Oakwood, North Maple, Bacon Road, and Shaker Road. The watershed around Shaker Pines Lake has the potential for residential flooding. Two residences in this area are predicted to be impacted during large rainstorms (USDA, 1996a).

There are four culverts, which do not meet the Town's design criteria for drainage along Jawbuck Brook; these are Oakwood Street, North Maple Street, Bacon Road, and Cottage Road (USDA, 1996a).

2. Waterworks and Grape Brook

Specific flooding problems and potential future problems in the Waterworks and Grape Brook watersheds have been identified. Minimal flooding was observed at Waterworks and Grape Brook during the 1989 and 1991 storms. High water on Waterworks Brook upstream from Theresa Avenue was reported during the June 1982 storm, but no specific flood height was documented in the Waterworks and Grape Brook Watersheds Flood Management Study (USDA, 1996b).

This floodplain management study also indicated that Route 91 and Route 5 are not in danger of being overtopped by Waterworks Brook for any of the storms modeled in this study, up to the 100 year storm. Four of the secondary and residential roads in this watershed do have the potential to be overtopped during the 10-year storm in the present condition watershed. The water surface profile show that Elm Avenue, the culvert just downstream from Elm Avenue, the second upstream crossing of Booth Road and Theresa Street are vulnerable to flooding. Booth Road, Tabor Road and Theresa Street also have flooding potential. All seven of these roads would be overtopped during the 25-year and 100-year storm events. One residence, just upstream from Theresa Street, within this watershed could also flood (USDA, 1996b).

Several culverts along Waterworks Brook do not meet the Town's drainage design criteria. These culverts are located in parking lots upstream from Bright Meadow Road, both Booth Road crossings, Elm Avenue just downstream from Elm Avenue, Tabor Road and Theresa Street (USDA, 1996b).

Route 91 and Route 5 are not in danger of being overtopped by Grape Brook for any of the storms modeled in this study. The secondary and residential roads in this watershed that have the potential to be

flooded include Tanglewood Drive, Gary Drive, Varno Lane, Aloha Drive, and Betty Road (USDA, 1996b).

3. Scantic River

The study of the Scantic River examines erosion effects resulting from development along the river's banks. To analyze the area's erosion and how it effects flooding in Enfield; the surficial geology of the Scantic River Watershed needs to first be examined.

The surficial geology of this area is comprised primarily of glacial deposits (glaciofluvial and glaciolacustrine) including glacial till, which were deposited during and following the last glaciation of the region. In the Scantic Watershed, stream terraces extended along the river valleys from late glacial streams that cut through the glacial deposits. These stream terraces are quite common the Western side of the Scantic River in the Town of Enfield. Steep escarpments on the riverside of these terraces are, in places, undergoing severe erosion, due to stormwater runoff. Erosion, sedimentation and weathering on the landscape are natural geologic processes that have been ongoing for millions of years.

In natural systems, the geologic rate of erosion remains in equilibrium with the rainfall and runoff, balancing sedimentation and erosion. This system of equilibrium has recurred over the course of 10,000 years. Urbanization causes the geologic rate of erosion to exponentially increase, which causes the equilibrium of rainfall and runoff with sedimentation and erosion to be tipped off balance. As this occurs, receiving waters for runoff need to continually establish a new equilibrium based on a changing set of parameters. As runoff increases from stormwater discharge into the drainage system from pavement, rooftops, other

impervious and deforested areas, flow velocity increases, creating additional erosion within the waterways (USDA, 1995).

The Scantic River is a system that has been affected by urbanization. The land use of the area has changed from forested to farmland to the current land use of single-family homes and roads. In the 1940's and 1950's a World War II building boom occurred along the Scantic River. The soil, composed of sandy and silty materials with little rock material, was very easy to develop and caused structural growth to increase rapidly throughout this era. The storm drainage systems for these developments used the most convenient locations to discharge street runoff. Storm water systems typically discharged into previously stable gullies (USDA, 1995).

With the additional flow from these stormwater outlets, the volume of runoff dramatically increased causing high velocity flow through narrow channels. At first, the gullies adjusted to their new streamflows and erosion was not yet obvious; however, as time passed, these gullies continued to downcut the existing soil material and widen, gradually increasing their depth as well as undercutting the clay side slopes. The increased development caused new adjustments to the volume of runoff, which dramatically accelerated the erosion of the area (USDA, 1995).

Slope failure is an end result of the increase in the volume of stormwater. As the slopes are undercut, the water table is lowered in the deposits. Because of their greater permeability, the very fine sands and silts drain quickly. Once the soils drain, the side slopes no longer have the strength to stand at such steep angles and they eventually fail. The existing trees, houses, roads, sewer and electric lines on these side slopes are all

threatened by continued stormwater flow, and the resulting slope failure (USDA, 1995).

Additionally, as these channels degrade, the pipe outlets are exposed. Some of these pipes are undermined to the point of failure and headwalls, constructed to support the pipes, have fallen in breaking the pipes. Additionally, the development along the Scantic River has resulted in the destruction of natural vegetation along the stream corridor and hazardous areas along the steep clay slopes. A decrease the environmental quality and economic value of the area has also been seen due to the disposal of debris, unwanted car parts and household appliances.

4. Beemans Brook

The flood of June 1982 caused noticeable flooding within the Beemans Brook Watershed. This flood affected residences that were located on Bridge Lane, Yale Drive, Broad Leaf Road, and Meadow Lark Road. Flood damages were recorded in the residential areas along the brook due to the low capacity of the existing culverts. Both overland flooding and basement flooding were reported (USDA, 1989).

Overland flow was reported between Bridge Land and Meadow Lark Road, due to restricted flows through several culverts. Overflow at these culverts caused street and residence flooding along the path of the tributary. The existing culverts in the residential area lack the capacity to pass peak discharges from a 10-year flood (USDA, 1989). Another factor, trash laden chain link fences located at the inlets, reduces the effectiveness of the existing culverts. The topography of this area is roughly flat which causes several of the houses to be flooded. Several of the houses in this area have basement windows and doors slightly higher than the bankful elevation of the stream (USDA, 1989).

Basements along Bridge Lane and Meadowlark Road were flooded due to a malfunction of the sewer system. The malfunction occurs when roof runoff fills the system to capacity, which in turn causes the backflow of sewerage into several residences. Besides causing property damage, the backflow of the sewerage also causes a health hazard for the residents of the house (USDA, 1989).

C. Existing Mitigation

There are two types of mitigation, regulatory and corrective. Regulatory measures include state and federal requirements pertaining to flood regulations and policies such as building codes and floodplain preservation through land acquisition. Structural changes are not considered a regulatory measure. An emergency warning system is another regulatory measure. Corrective measures are physical changes that decrease the effects of flooding and the damages associated in an inundated area. These measures include levees or floodwalls, installation or replacement of culverts designed to manage water-flow during large storms, drainage system maintenance, dam upkeep or construction, flood-proofing of structures, and floodplain reclamation.

Regulatory Mitigation Measures within the Town of Enfield

a. Town of Enfield's Zoning Ordinance

An important regulatory mitigation measure, Chapter 23 of the Town of Enfield's Zoning Ordinance, is the preservation and usage of land within the conservation zone. The Town of Enfield follows specific standards, set by the Connecticut Special Act No. 79-77, with the intention of preserving the land within the conservation zone. The standards

are designed to protect and improve the water quality of the Connecticut River. For flood mitigation, these guidelines are intended to preserve the necessary flood storage capacity of the Connecticut River flood plain and its tributary flood plains (Town of Enfield, 1995). The standards promote public health, safety and general welfare through minimizing flood losses in flood plain areas, as well as to encourage flood plain use which is compatible with beneficial flood plain values and goals of the Connecticut River Assembly Program (Town of Enfield, 1995).

Chapter 23 outlines standards that prohibit the obstruction or encroachment of the flood plain by any person, firm or corporation, public or private, unless the proper town authorization is received (Town of Enfield, 1995). The activities that are compatible with flood plain values include conservation activities, which do not require significant physical alternation of watercourses and flood plains. Additional encouraged activities include wildlife or nature preserves; game farms and fish hatcheries; and parks and recreation areas. These activities are supported, although specific requirements must be followed concerning the protective limitations outlined for flood plain areas (Town of Enfield, 1995).

b. Enfield Town Code

The Enfield Town Code, in Article II, Section 4-15 through 4-32, defines a regulatory mitigation measure for the Town of Enfield entitled "Flood Damage Prevention". The State of Connecticut, Chapter 99, Section 7-194, appoints responsibility to local government units to determine regulations designed to protect the public health, safety and general welfare of its citizens. The article on Flood Damage Prevention was designed by the Town Council to insure that the citizens of

Enfield were adequately safeguarded from flood hazards (Town of Enfield, 1997).

To promote the public health, safety, and general welfare, and to minimize public and private losses due to flood conditions in specific areas, a provision (Section 4-20) was developed which requires that a development permit must be obtained before construction or development begins within any area of special flood hazard (Town of Enfield, 1997). A development permit can be obtained through the completion of an application through the Enfield Planning and Zoning Commission. The application requests information such as: plans in duplicate drawn to scale showing the nature, location, dimensions, and elevations of the area in question; existing or proposed structures, fill, storage of materials, drainage facilities; and the location of the foregoing (Town of Enfield, 1997).

Section 4-17b of the Town of Enfield Code of Ordinances specifies methods of reducing flood losses. These methods include:

- restriction or prevention of uses that endanger the health or safety of the community, or that result in damaging increase in erosion or in flood heights or velocities;

- requiring that any use that is a flood sensitive activity include protection against flood damages at the time of initial construction;

- regulation of the alteration of natural floodplains, stream channels, and natural protective barriers, which channel floodwaters;

- control of any filling, grading, dredging and other development which increases flood damage; and

- detering or regulating of any construction of flood barriers which will unnaturally divert floodways or which may increase flood hazards in other areas (Town of Enfield, 1997).

The Town of Enfield follows predetermined specifications on residential construction, nonresidential construction, water holding capacity, and encroachments. For residential construction, the Town of Enfield follows nationally recognized model codes for one and two family houses set by the Council of American Building Officials (CABO). Section 406 of the 1995 Edition of CABO specifies building codes associated with Foundation Waterproofing and Dampproofing. Additional flood proofing codes, such as drainage specifications, are also listed as part of the building codes (Council of American Building Officials One and Two Family Dwelling Code, 1995).

For nonresidential construction, the Town of Enfield follows nationally recognized codes for industrial and commercial structures prescribed by the Building Officials and Code Administrators (BOCA) for the protection of public health, safety and welfare. Section 1812 of the BOCA National Code for 1996 outlines flood related building codes such as waterproofing and damp-proofing. Material specification, surface preparation, drainage systems and water table investigations are important facets of building codes associated with flood protection (Building Officials and Code Administrators National Building Code, 1996).

Additionally the Town of Enfield's Code of Ordinances specifies that

- the holding capacity of the floodplain shall not be reduced. Any reduction caused by structures, improvements, filling, regrading, or other type of development of land shall be compensated by increasing the floodplain;

- within the floodplain as designated on the maps, all encroachments, including fill, new construction, substantial improvements to existing structures, and any other development are prohibited unless

certification by a registered professional engineer is provided that confirms that such encroachment will not result in an increase in the base flood elevation;

a floodway is the channel of a river or other watercourse and the adjacent land areas that must be reserved in order to discharge the base flood without cumulatively increasing the water surface elevation more than one foot. Since the floodway is considered to be an extremely hazardous area due to the velocity of floodwaters which carry debris, potential projectiles and erosion potential strict provisions were detailed within the Enfield Town Code; and

within the floodway, encroachments are prohibited, unless it has been professionally determined that the flood levels will not increase during the occurrence of the base flood discharge (Town of Enfield, 1997).

c. Inland Wetlands and Watercourses Regulations Town of Enfield

The “Inland Wetlands and Watercourses Regulations of the Town of Enfield” is a third important regulatory flood hazard mitigation tool. The map entitled “Land Use Map, Town of Enfield, Approved by the Enfield Inland Wetlands Agency, 1976”, delineates the general location and boundaries of wetlands and watercourses. This map can be utilized to determine the location of regulated areas (Town of Enfield, 2000b).

Wetlands are relevant in the mitigation of flooding because they have sponge-like properties that result in the absorption of water. When an area is developed, generally the amount of impervious area increases and the rate of infiltration decreases. Because of their unique ability to absorb water, wetlands are an essential part of the water system and are necessary for the hydrological stability and control of flooding and erosion. The Town of Enfield’s Inland Wetland and Watercourse

Regulations were designed to safeguard the citizens of the state from flooding and erosion. This would be accomplished with regulations intended to protect, preserve, maintain, and also aid in the proper use of inland wetlands and watercourses. The flood mitigation goal of the regulations is to deter and inhibit the danger of inundation and pollution (Town of Enfield, 2000b)

The activities regulated by the state in or affecting wetlands or watercourses include:

- construction or modification of any dam;
- construction or placement of any structure or obstruction within the stream channel encroachment lines;
- diversion of water in excess of fifty thousand (50,000) gallons per day or any surface waters of the state where the tributary watershed area above the point of diversion is 100 acres or larger;
- discharges into the water of the state; and
- discharge of fill or dredged materials into the wetlands and watercourses of the state (Town of Enfield, 2000b)

The Inland Wetland and Watercourses Agency of the Town of Enfield requires the receipt of a permit for any activity within a wetland and/or watercourse area.

d. Town of Enfield’s Flood Warning System

During an emergency, the Town of Enfield interacts directly with the Connecticut Office of Emergency Management. Enfield is in the 34 town group comprising Area III of the Connecticut Office of Emergency Management. In order to reduce response times in the case of an emergency, the Town of Enfield will inform the Area III office immediately of the nature of the developing emergency and the nature of assistance likely to be needed. Communications with the Area III office are available through the State Fire Radio System from the Town’s communication

center at the Public Safety Complex, telephone, or fax. The area III office will be kept continuously informed of steps taken to secure aid in major emergency situations (Town of Enfield, 1993).

Although there are no radio stations located in Enfield there are several stations that provide local coverage in the case of an emergency. These stations include WTIC (96.5 FM, and 1080 AM) and WDRC (102.9 FM and 1360 AM), both of which are located in Hartford; and WMAS (94.7 and 1450 AM) and WKIX (97.9 FM), both of which are located in Springfield. Channels 3, 20, 22, 24, 30, 40, 57 and 61 provide television coverage on emergencies (Town of Enfield, 1993).

2. Structural Mitigation Measures within the Town of Enfield

a. Structural Improvements Completed in the Last Ten Years

The Town of Enfield has shown a long-term commitment to flood mitigation by continually working to protect the Town's citizens from flood danger by improving its infrastructure on a continual basis. Tables 1a and 1b outline important structural mitigation projects that have been completed in Enfield within the last ten years. These infrastructure improvements include:

- Enfield Memorial Industrial Park Drainage Channel Improvements;
- Betty Road Cross Culvert Reconstruction (Grape Brook);
- Michael Drive Drainage Channel Reconstruction;
- Brainard Road Reconstruction (including improvements to St. Martha's Pond);
- Beemans Brook Phases I and II (inlet improvements at Meadowlark Road);
- Elm Street Reconstruction Phase II (including box culvert over Freshwater Brook);

- Reconstruction of Park Avenue Storm Drainage
- Virginia Avenue Storm Drainage;
- Montano Road Subdivision Drainage Improvements;
- Memorial Park Drainage Channel Reconstruction;
- Old King Street Bridge Replacement;
- West Forrest Drive Reconstruction Project;
- First, Second and Third Street Reconstruction Project;
- Weymouth Road Reconstruction;
- Westerly Drive Cross Culvert Inlet Improvements (Terry Brook);
- Post Road Storm Drainage Improvements
- Abbe Road Reconstruction (bridge replacement over Buckhorn Brook);
- Shaker Road Widening Project (new culvert at Jawbuck Brook); and
- Thompsonville Sanitary Sewer Separation Project.

D. Capabilities & Resources

This section outlines permanent programs and regulations that contribute to flood damage mitigation. Enfield has a history of prioritizing the distribution of financial and human resources to assist in the prevention of hazards associated with flooding. The community has recently received a Flood Mitigation Assistance Grant from the State of Connecticut's Department of Environmental Protection, as well as being selected as a recipient for the Flood Mitigation Assistance Program for the property acquisition for a house on Lynch Terrace.

In undergoing the application process the town has developed the expertise necessary to efficiently and effectively prepare grant applications. Enfield staff also has the technical, legal and environmental expertise to develop and implement necessary regulations, ordinances and policies. Through the Town's past efforts, it has developed good working

relationships with the federal and state levels of government involved in flood management.

While there is no municipal budget specifically for flood hazard mitigation, dollars are spent for the reduction of flood damage through the acquisition of open space, road reconstruction projects that include drainage system improvements, education, staffing, and other areas. Recent projects have shown that the residents of Enfield have, on a continual basis, been willing to fund projects designed to protect their families and property from flood damage.

E. Objectives & Actions

This Section explains the broad goals and objectives that have been identified for furthering flood damage reduction. Following each goal or objective, specific actions for implementation have been identified, as well as potential funding sources and estimated time frames for completion.

1. Education Objectives

Enfield's educational objectives are intended to inform and update specific groups on flood hazards and flood hazard issues. Tables 2a and 2b outline the planned educational objectives, which are also summarized as follows:

Geographical Information Systems Town-wide Mapping Project.

Anticipated funding has been allotted for a program to complete Geographical Information Systems (GIS) Town-wide base mapping including all planimetric and topographic features. This information will be electronically digitized into separate layers and used for projects within the Department of Public Works and the Engineering Division. (Town of Enfield, 1999a). This program will be an important educational resource as a

mapping tool that is available and easily accessed for day to day use.

Flood Insurance Policy Seminar

The flood insurance seminar would be an hour and a half program held at Central Library one evening a year that is designed to educate local homeowners with basic information on flood insurance rates, policies and claims.

Town Staff and Regulatory Board Flood Hazard Workshop.

This workshop would focus on updating the town staff and representatives from the regulatory board on the Department of Environmental Protection's flood hazard mitigation strategies. The meeting will be a daytime event lasting one to two hours.

Emergency Management Preparedness Work Group Meeting.

The Emergency Management Team has regularly scheduled meetings twice a year to discuss prevalent emergency management information. The Team will host a meeting to discuss emergency management and how it relates to flooding. The program will be held during the day and will be a two and a half hour event.

Enfield Insurance Agents Meeting on National Flood Insurance Policies.

There are 99 currently NFIP within the Town of Enfield. These policies are available from private insurance companies or directly through the NFIP. There are a total of 22 claims on the NFIP that have been filed within the Town (Ledbetter, 2000). The Independent Insurance Agents in Wethersfield will host an informational session on the current National Flood Insurance Policies required by the Federal Emergency Management Administration. The target group of the information session is insurance agents in Enfield and the information supplied will be a more in depth look at NFIPs. The cost is \$80

person for the four-hour session, which will be paid by the insurance agent attending the information session.

Flood Hazard Mitigation Brochure Availability.

Brochures designed and distributed by the CT Department of Environmental Protection will be available to provide educational updates on flood mitigation. The location of the flood management brochures is still to be determined.

Town of Enfield Staff Attendance at Annual FEMA Conference.

The Town of Enfield will encourage staff members whose jobs are associated to flood mitigation 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 Grants program, and NFIP. Staff from the appropriate town offices will attend the DEP and OEM training workshops annually.

2. Flood Insurance Objectives

Education on Flood Insurance Policies.

Incorporate information on the availability of flood insurance in the hazard related public education workshops (See 1a, 1d-1f)

Flood Insurance Brochures.

Make available FEMA provided flood insurance brochures at public accessible place such as the Town Clerk's office or the Planning and Zoning Department Offices.

Floodplain Insurance Rate Map Risk Assessment.

The Flood Insurance Rate Maps (FIRMs) were last completed in 1980 for the Town of Enfield. During the last 20 years significant changes have been made in flood prone areas and several of Enfield's watersheds. An update of the FIRMs can be done with a request to FEMA concerning specific vulnerability assessments of areas, which have reduced the chance of flooding through flood mitigation. This would result in a decrease in the cost of flood insurance rates in an area that has successfully decreased flood hazards.

3. Property Acquisition Objectives

Property acquisition is an effective method of flood mitigation because it affords permanent form of mitigation in which the town purchases the property of an owner who has filed repetitive flood loss claims. The property is then reallocated for uses that do not involve residential or industrial use, such as open space.

Lynch Terrace.

The Town of Enfield has applied for a Hazard Mitigation Grant to assist in the acquisition of a house on Lynch Terrace. This property has been determined to be in a flood hazard prone area. In this acquisition the land and structure will be purchased and the structure will be demolished. This land will then be designated as open space.

Additional Property Acquisitions.

The Town of Enfield will continue its endeavor in the acquisition of additional structures that are located in flood hazard prone areas.

Scantic River Land Acquisitions Project.

The Town of Enfield, with the assistance of the Department of Environmental Protection,

has an ongoing plan that encompasses the purchase land adjacent to the Scantic River between Rt. 191 and Rt. 190 in the Abbe Road vicinity.

4. Grant Funded Flood Mitigation Projects Objective

Enfield has been very successful in working with citizens with flood prone property to obtain and administer grants from FEMA. Enfield will continue to work with interested citizens to actively pursue project funding.

5. Regulatory Improvements Objective

Town of Enfield's Regulations and Ordinances.

Town Regulations and Ordinances related to flood protection, including the Waterway Protection Line Ordinance and the Inland Wetlands and Watercourses Regulations are reviewed and updated every ten years to further the goal of flood damage reduction.

The Open Space and Farmland Preservation Program.

The flood hazard mitigation goal within this program is to preserve floodplains and natural drainage areas by identifying key flooding sites where there are no existing development limitations for preservation efforts and maintain a level of awareness of flood issues during development review processes. This new program is in its fundamental planning stages.

6. Stream Channel and Drainage System Maintenance and Improvements Objective

A number of storm drainage installation and repair projects were approved within the Capital Improvement Program. The Capital Improvement Program is a comprehensive list of public improvement projects, which are proposed for the Town over the course of a six-year interval. Each year the Capital Improvement Program is reviewed and extended another year, thus maintaining a constant list of programs budgeted over a six-year time period. Annual review of the programs allows the Town to adapt to changing circumstances, and also modify plans and priorities, as needed.

The funding for Capital Improvement Projects may be supplied from General Revenues, State Grants, as well as other additional private or public sources. Capital Improvement Projects are dynamic projects that may be modified, as needed, in terms of the originally planned cost and scope of services (Town of Enfield, 1999a). The following is a list of corrective mitigation measures that are currently being constructed, or in which a construction process is scheduled to begin within 2000-2001 fiscal year (Town of Enfield, 1999a).

Beemans Brook III Drainage Project
Oliver Road Pipe Replacement and Channel Cleaning
Pleasant Road Culvert Removal and Replacement
Buckhorn Estates Storm Drainage Project
Park/Harrison Drainage System
Reconstruction Project
Catch Basin Cleaning Project
Sun Street Drainage Outlet
Green Manor Catch Basin Project
Gordon Lane Drainage Improvement Project
J.F.K. Middle School Storm Drainage Outlet
Reconstruction and Extension
South Maple Street Bridge Replacement

Roosevelt Boulevard Storm Drainage Improvement Project
Brook/Ditch Cleaning and Maintenance Program
Catch Basin Maintenance Program
Road 2000
Freshwater Pond Dredging Project

Tables 3a, 3b, 3c and 3d provide a more in depth description of mitigation measures *a* through *l*. Measures *m* and *n* have longer descriptions due to the larger extents of these two projects.

“Road 2000” is an ongoing, three-year project funded by a Town Net Bond Issue. The project consists of flood mitigation improvements including drainage system upgrades and seed planting, along with additional surficial improvements to the paving, curbing and driveway aprons. The three-year plan is a comprehensive plan that encompasses a large amount of the existing roadways. The drainage system upgrades will decrease the amount of stormwater overflow during heavy rainfalls. The seed planting will also promote flood mitigation because the plants will assist in the absorption of excess water (Town of Enfield Department of Public Works, 2000).

The “Freshwater Pond Dredging Project” involves the Freshwater Pond, which is a 4.5 \checkmark acre artificial impoundment of Freshwater Brook located in the western section of Enfield. The pond’s environmental quality has shown a steady decline due to the combined impacts of watershed development and previous inflows of sediment from storm drain sources. The underlying problem of the pond is the continual increase in sediment deposition. The proposed plan is to remove the recently deposited sediment to increase the pond depth and restore the recreational benefits of the pond (Baystate Environmental 1999). Additionally the dredging will include

sediment removal from the Freshwater Brook channel upstream to Route 5 and the construction of a new low-level outlet as key elements in the project’s control and diversion of water (Baystate Environmental, 2000).

7. On-going Projects and Recent Purchases for Flood Hazard Mitigation

The following measures are being undertaken as flood mitigation measures; these measures are further detailed in Tables 4a and 4b.

Maintenance and cleaning of various brooks;
Leaf collection / equipment replacement;
Culvert inspection for pipes under 20”;
Establishment of a Geographical Information System;
Catch basin cleaning / equipment purchase;
Catch basin cleaning program; and
Land acquisition.

IV. PROGRESS MONITORING

Public participation involved in creating this plan consisted of several town meetings. The Town of Enfield’s Conservation Committee, the Planning and Zoning Commission, and the Town Council reviewed and commented on the Flood Hazard Mitigation Plan during these meetings.

Important information and input, for the plan, was received from a community planning team comprised of municipal representatives from the Planning and Zoning Commission, the Conservation Commission, Economic Development Commission, Department of Public Works, Building Department, Emergency Management Director, and the Town’s Manager’s Office.

TECHNICAL AND FINANCIAL RESOURCES

FEDERAL RESOURCES

1. Federal Emergency Management Agency
Region I Office
J.W. McCormack POCH, Room 462
Boston, MA 02109-4595
(617) 223-9575

Mitigation Division

The mitigation division administers all of the mitigation programs that are designed by FEMA to assist in the prevention of damage caused from natural disasters, such as flooding. The FEMA mitigation programs include the preparation and revision of Flood Insurance Studies, Flood Boundary Maps and Flood Insurance Rate Maps; which designate the flood plain areas. FEMA also assists in the acquisition of flood prone property, relocation, and retrofitting programs. The National Flood Insurance Program and the Community Rating System are also programs developed by FEMA (Federal Emergency Management Program, 2000b).

Technical Assistance Contracts

Technical Assistance Contracts are activities designed to support and strengthen the effectiveness of natural hazard reduction program efforts. These contracts provide skills and services to assist in reaching mitigation goals. FEMA requests technical assistance in mitigation situations where specialists are needed to obtain detailed information. There are two technical assistance programs that provide technical support to state/local communities in flood mitigation: the Hazard Mitigation Technical Assistance Program (HMTAP) and the Wind and Water Technical Assistance Program (WAWTAP). The HMTAP is a program created to provide technical assistance in support of post disaster mitigation initiatives. The WAWTAP is a program created to provide short-term assistance to support the flood programs. The program was designed to increase the local community's ability to become more resistant to hazards related to flooding (Federal Emergency Management Program, 2000b).

Hazard Mitigation Grant Program (HMGP)

The HMGP is a post-disaster mitigation program that provides grants to States and local governments to implement long-term hazard mitigation measures after a major disaster declaration (Federal Emergency Management Program, 2000a). Partial responsibility by the State or local government needs to be demonstrated with a cost-share requirement of 25% to match the federal funds provided (Connecticut Department of Environmental Protection, 1997).

Flood Mitigation Assistance Program (FMA)

The FMA is a pre-disaster mitigation program created by the National Flood Insurance Reform Act of 1994. This program provides both project and planning grants yearly for flood hazard mitigation planning and projects that demonstrate benefits to the NFIP insurance fund (Connecticut Department of Environmental Protection, 1997).

Small Business Administration (SBA)
Disaster Area Office
360 Rainbow Blvd. S.
3rd Floor
Niagara Falls, NY 14303
(Small Business Association, 2000a)

SBA has the authority to “declare” disaster areas following flood emergencies that affect a significant number of homes and businesses, but that would not need additional assistance through FEMA. This disaster notification can only be done after a FEMA declaration (Connecticut Department of Environmental Protection, 1997). The purpose of the SBA’s Disaster Loan Program is to offer financial assistance in the rebuilding of homes and businesses in the aftermath of a disaster. The SBA assists in long-term recovery efforts by offering low interest loans (Small Business Association, 2000b).

Environmental Protection Agency
Region I – JFK Federal Building, Government Center,
Boston, MA 02203
(617) 565-3400

The Environmental Protection Agency offers Capitalization Grants for State Revolving Funds which are low interest loans and other financial assistance to aid in the construction or repair to wastewater treatment facilities damaged in floods (Connecticut Department of Environmental Protection, 1997).

Clean Water Act Section 319 Grants

The CT DEP, Bureau of Water Management, Planning and Standards Division administer cost-share grants to site agencies to be used for funding watershed resource restoration activities, including wetlands and other aquatic habitat. This grant only supports activities that control non-point pollution (Connecticut Department of Environmental Protection, 1997).

United States Department of Housing and Urban Development
330 Main Street
Hartford, CT 06106
(860) 240-4515

and

Connecticut Department of Economic and Community Development
505 Hudson Street
Hartford, CT 06106
(860) 566-5310

Community Development Block Grants (CDBG)

Both the U.S. Department of Housing and Urban Development (HUD) and the CT Department of Economic and Community Development offer CDBGs. Communities with populations greater than 50,000 receive funds directly from HUD as part of the Entitlement Cities and Urban Counties Program. Non-entitlement areas, communities smaller than 50,000, compete for funds allocated to the state Department of Economic Development (United States Department of Housing and Urban Development, 2000). Program objectives include the improvement of housing conditions for low and moderate income families, acquiring flood prone home, or protecting the from flood damage (Connecticut Department of Environmental Protection, 1997). A separate set of funds, designed for conditions that create an "imminent threat", have been used for uses such as the replacement and/or redesign of bridges where flood damage eliminated police and fire access to the other side of the waterway (Connecticut Department of Environmental Protection, 1997).

United States Army Corps of Engineers
Special Studies Branch
424 Trapolo Road
Waltham, MA 02254
(617) 647-8505

The U.S. Army Corps of Engineers provides funding for floodplain management planning and technical assistance under the Floodplain Management Services Program. Examples of projects completed under this program include beach re-nourishment, stream clearance and snagging projects, flood proofing, and flood preparedness. This program is funded on a 50/50 matching basis by the Section 22 Planning Assistance to States program. The U.S. Army Corps of Engineers is also authorized to relocate homes located within the floodplain, if the relocation is more cost effective than a structural flood control measure (Connecticut Department of Environmental Protection, 1997).

The United States Department of Commerce
National Weather Service
445 Myles Standish Blvd.
Taunton, MA 02780
(508) 823-2266

The United States Department of Commerce prepares and issues flood, severe weather, and coastal storm warnings. National Weather Service hydrologists work with communities on flood warning issues and can give technical assistance in preparing flood warning plans (Connecticut Department of Environmental Protection, 1997).

The United States Department of the Interior
National Park Service
Rivers and Trails Conservation Program
Regional Office, 15 State Street
Boston, MA 02109
(617) 223-5203

The National Parks Service provides technical assistance with planning for open space preservation and identification of options for floodplain development (Connecticut Department of Environmental Protection, 1997).

The United States Department of the Interior
Fish and Wildlife Service
New England Field Office
22 Bridge Street, Unit #1
Concord, NH 03301

The Fish and Wildlife Service provides technical and financial assistance to restore wetlands and riparian habitats through the North American Wetland Conservation Fund and Partners for Wildlife programs (Connecticut Department of Environmental Protection, 1997).

United States Department of Agriculture (USDA)
Natural Resources Conservation Service
Connecticut Office

The USDA provides technical assistance to individual land owners, groups of landowners, communities, and soil and water conservation districts on land-use and conservation planning, resource development, stormwater management, flood prevention, erosion control and sediment reduction, detailed soil surveys, watershed/river basin planning and recreation, fish and wildlife management. The Emergency Watershed Protection Program, the Cooperative River Basin Program and the Small Watershed Protection Program are programs that offer financial assistance (Connecticut Department of Environmental Protection, 1997).

STATE RESOURCES

1. Connecticut Department of Environmental Protection
Bureau of Water Management, Inland Water Resource Division
79 Elm Street
Hartford, CT 06106
(860) 424-3706

The Inland Water Resource Division of the Bureau of Water Management is generally responsible for flood hazard mitigation in Connecticut, including the administration of the National Flood Insurance Program (Connecticut Department of Environmental Protection, 1997). The following is a list of contacts and resources that are available to assist in flood mitigation within the State of Connecticut.

National Flood Insurance Program State Coordinator is responsible for flood insurance, floodplain management technical assistance, floodplain management ordinance review, substantial damage/improvement requirements, community assistance visits, and other general flood hazard mitigation planning (Connecticut Department of Environmental Protection, 1997).

State Hazard Mitigation Officer is responsible for hazard mitigation planning and policy, oversight of administration of the Hazard Mitigation Grant Program, and Flood Mitigation Assistance Program (Connecticut Department of Environmental Protection, 1997).

Flood Warning and Forecasting Services prepares and issues flood, severe weather, and coastal storm warnings (Connecticut Department of Environmental Protection, 1997).

The Flood and Erosion Control Board Program provides assistance to municipalities to solve flooding, beach erosion and dam repair problems. Certain non-structural measures that mitigate flood damages are also eligible. Funding is provided to communities that apply for assistance through a Flood and Erosion Control Board on a noncompetitive basis (Connecticut Department of Environmental Protection, 1997).

The Stream Channel Encroachment Line Program places restrictions on the development of floodplains along certain major rivers (Connecticut Department of Environmental Protection, 1997).

The Inland Wetlands and Watercourses Management Program provides training, technical and planning assistance to local Inland Wetlands Commissions (Connecticut Department of Environmental Protection, 1997).

Dam Safety Program has the responsibility to administer and enforce Connecticut's dam safety laws. The program determines permitting for the construction, repair or alteration of dams, dikes, or similar structures and maintains a registration database of all known dams statewide. To maintain safe structures, a statewide inspection program is also operated (Connecticut Department of Environmental Protection, 1997).

2. Connecticut Department of Environmental Protection
Bureau of Water Management, Planning and Standards Division
79 Elm Street
Hartford, CT 06106
(860) 424-3706

The Planning and Standards Division of the Bureau of Water Management administers the Clean Water Fund and many other programs that are directly and indirectly related to hazard mitigation. The additional programs run by this division include Rivers Restoration Grant Program, Section 319 Non-point Source Pollution Reduction Grants, and the Municipal Facilities Program which deals with mitigating pollution from wastewater treatment plants (Connecticut Department of Environmental Protection, 1997).

Connecticut Department of Public Safety
Office of Emergency Management (OEM)
360 Broad Street
Hartford, CT 06105
(860) 566-5483

The Office of Emergency Management is the lead agency responsible for crisis management, which includes emergency preparedness, response and recovery, mitigation, and an extensive training program. The OEM is the State point of contact for most FEMA grant and assistance programs and operates a mitigation program to coordinate mitigation through out the state with other government agencies (Connecticut Department of Environmental Protection, 1997).

Connecticut Department of Public Safety
Office of the State Building Inspector
360 Broad Street
Hartford, CT 06105
(860) 566-5483

The Office of the State Building Inspector is responsible for administering and enforcing the Connecticut State Building Code and also the municipal Building Inspector Training Program (Connecticut Department of Environmental Protection, 1997).

Department of Transportation
Berlin Turnpike
Newington, CT
(860) 594-3236

The Department of Transportation administers the Federal Intermodal Surface Transportation Efficiency Act (ISTEA) which includes grants for projects, which promote alternative or improved methods of transportation. Funding through grants may be used for projects, with mitigation benefits, such as preservation of open space in the form of bicycling and walking trails (Connecticut Department of Environmental Protection, 1997).

REGIONAL RESOURCES

Connecticut Conference of Municipalities
900 Chapel Street, 9th Floor
New Haven, CT 06510
(203) 498-3000

Connecticut Council of Small Towns
1245 Farmington Avenue, Suite 101
West Hartford, CT 06107
(860) 676-3069

Regional Councils of Governments
Capital Region Council of Governments
(860) 522-2217
Council of Governments of Central Naugatuck Valley
(203) 757-0535
Northeastern Connecticut Council of Governments
(860) 774-1253

Northwestern Connecticut Council of Governments
(860) 868-7341
South Central Regional Council of Governments
(203) 234-7555
Southeastern Connecticut Council of Governments
(860) 889-2324
Valley Council of Governments
(203) 735-8688
(Connecticut Department of Environmental Protection, 1997)

Regional Planning Agencies
Central Connecticut Regional Planning Agency
(860) 589-7820
Connecticut River Estuary Regional Planning Agency
(860) 388-3497
Greater Bridgeport Regional Planning Agency
(203) 366-5405
Housatonic Valley Council of Elected Officials
(203) 775-6256
Litchfield Hills Council of Elected Officials
(860) 491-3647
Midstate Regional Planning Agency
(860) 347-7214
Southwestern Regional Planning Agency
(203) 866-5543
Valley Regional Planning Agency
(203) 735-8688
Windham Regional Planning Agency
(860) 456-2221
(Connecticut Department of Environmental Protection, 1997)

PRIVATE AND OTHER RESOURCES

The Association of State Floodplain Managers
4233 W. Beltline Highway
Madison, WI 53711
(608) 274-0123
<http://www.floods.org>

The Association of State Floodplain Managers an organization of professionals involved in floodplain management, flood hazard mitigation, flood preparedness, flood warning, flood recovery, and the National Flood Insurance Program. This association supports the structural and nonstructural management of the nation's floodplains and related water sources and provides technical advice to governments and other entities about proposed actions or policies that will affect flood hazards, and encourages flood hazard research, education and training (The Association of Floodplain Managers, 2000).

Natural Hazards Center
Campus Box 482
University of Colorado
Boulder, CO 80309-0482
(303) 492-6818

The Natural Hazards Center includes the Floodplain Management Resource Center, a library and referral service, for floodplain management publications.

New England Flood and Stormwater Managers Association, Inc.
McCormack Post Office
P.O. Box 676
Boston, MA 02102-0676
<http://www.seacoast.com/~nefsma/about.htm>

The New England Floodplain and Stormwater Managers Association, Inc. facilitates the exchange of information, ideas, and experiences relative to floodplain management, as well as to provide educational opportunities and the dissemination of general and technical information to the public and professionals concerning floodplain and stormwater management (New England Floodplain and Stormwater Managers Association, Inc., 2000).

National Emergency Managers Association
c/o Council of State Governments
3650 Iron Works Pike
P.O. Box 11910
Lexington, Kentucky 40578-1910
(606) 244-8000
<http://www.nemaweb.org>

The National Emergency Managers Association provides information and assistance resource for state and territorial directors on comprehensive emergency management (National Emergency Managers Association, 2000).

Northeast States Emergency Consortium
419 Main Street
Suite #5
Wakefield, MA 01880
<http://www.nesec.org/index1.htm>

The Northeast States Emergency Consortium is a non-profit organization supported and funded by the Federal Emergency Management Agency that works in partnership with government and private organizations to reduce losses of life and property resulting from natural disasters (Northeast States Emergency Consortium, 2000).

Institute for Business and Home Safety
73 Tremont Street, Suite 510

Boston, MA 02109-3910
(617) 722-0200
<http://www.ibhs.org>

The Institute for Business and Home Safety is an initiative of the insurance agency with the purpose of reducing deaths, injuries, property damage, economic losses and human suffering caused by natural disasters by advocating the development and implementation of building codes and standards nationwide (The Institute for Business and Home Safety, 2000).

Computer Science Corporation
New England Headquarters
140 Wood Road, Suite 200
Braintree, MA 02184
(617) 848-1908

The Federal Insurance Administration contracts out the Computer Science Corporation to serve as the National Flood Insurance Program Bureau and Statistical Agent. The Computer Science Corporation provides information and assistance on flood insurance, including handling policy and claims questions, and providing workshops to lenders, insurance agents, and communities (Connecticut Department of Environmental Protection, 1997).

Volunteer Organizations

Volunteer Organizations such as the American Red Cross, the Salvation Army, Habitat for Humanity, Interfaith, and the Mennonite Disaster Service are often available to assist after or during disasters (Connecticut Department of Environmental Protection, 1997).

Flood Relief Funds

Local businesses, residents, and out-of-town groups often donate Flood Relief Funds after a disaster (Connecticut Department of Environmental Protection, 1997).

Americorps

Americorps is a National Community Service Organization in which teams of workers assist with landscaping projects such as surveying, tree planting, restoration, construction and environmental education (Connecticut Department of Environmental Protection, 1997).

Works Cited

Alexander Law Firm (1996). Answers to Questions About the National Flood Insurance Project. San Jose: Alexander Law Firm.

Association of State Floodplain Managers (2000). About the Association of State Floodplain Managers [4 paragraphs]. Available FTP: Hostname: floods.org Directory: www.floods.org

Baystate Environmental Consultants, Inc. for Town of Enfield (1999). Dredging Feasibility Report – Freshwater Pond Dredging Project. Unpublished manuscript prepared for the Town of Enfield Department of Public Works.

The BOCA National Building Code/1996. (13th Ed.) (1996). Country Club Hills, Illinois: The Building Officials and Code Administrators International.

CABO One and Two Family Dwelling Code/1995. (1995). Falls Church, Virginia: The Council of American Building Officials.

Community Based Hazard Mitigation Planning (1998). Lowering the Risks and Costs of Disasters. (Available from the Connecticut Office of Emergency Management, 360 Broad St., Hartford, CT 06105)

Connecticut Capitol Region Growth Council (2000). Enfield Economic Development Report. (Available from the Town of Enfield, 820 Enfield St., Enfield, CT 06082)

Connecticut Department of Transportation (1995). Standard Specifications for Roads, Bridges and Incidental Construction, Form 814A.

Connecticut Department of Environmental Protection, Inland Water Resources Division; Department of Public Safety, Office of Emergency Management (1997). Community Natural Hazards Mitigation Planning Guidebook.

Federal Emergency Management Agency; Federal Insurance Administration (1979). Town of Enfield Flood Insurance Study.

Federal Emergency Management Agency (2000a). Mitigation Programs and Activities [8 paragraphs]. Available FTP: Hostname: techast.htm Directory: www.fema.gov/MIT/program.htm

Federal Emergency Management Agency (2000b). Mitigation Technical Assistance Programs [13 paragraphs]. Available FTP: Hostname: techast.htm Directory: www.fema.gov/MIT/techast.htm

Federal Emergency Management Agency (2000c). FEMA - History of the Federal Emergency Management Agency [9 paragraphs]. Available FTP: Hostname: history.htm Directory: www.fema.gov/about/history

Federal Emergency Management Agency (2000d). Flood Zone Descriptions [14 paragraphs]. Available FTP: Hostname: TMC_9974.htm Directory: www.fema.gov/mit/tsd/TMC_9974.htm

Federal Emergency Management Agency (2000e). Unnumbered A-Zones [16 paragraphs]. Available FTP: Hostname: TMC_9932.htm Directory: www.fema.gov/mit/tsd/TMC_9932.htm

Federal Emergency Management Agency (1986). Retrofitting Floodprone Residential Structures. Unpublished document.

Institute for Business and Home Safety (2000). [3 paragraphs]. Available FTP: Hostname: ibhs.org Directory: www.ibhs.org/

Ledbetter, Carol (2000, February 09 and 2000, February 08). Flood Emergency Management Administration. Email correspondence: Carol.Ledbetter@fema.gov

Maguire Group, Inc. for the Town of Enfield, Connecticut, Department of Public Works (1990). Beemans Brook Flood Study Final Report.

National Emergency Managers Association (2000). Who We Are [4 paragraphs]. Available FTP: Hostname: index.cfm Directory: www.nemaweb.org/index.cfm

Natural Resource Center (1983). Realizing the Risk: A History of Floods in Connecticut. Westport: L.R. Associates.

New England Floodplain and Stormwater Managers Association, Inc. (2000). History and Purpose [4 paragraphs]. Available FTP: Hostname: about.htm Directory: www.seacoast.com/~nefsma/about.htm

Northeast State Emergency Consortium (2000). About Northeast State Emergency Consortium [4 paragraphs]. Available FTP: Hostname: about.htm Directory: www.nesec.org/about.htm

Small Business Administration (2000a). Disaster Assistance District Area Offices [4 paragraphs]. Available FTP: Hostname: dao.html Directory: www.sba.gov/DISASTER/mission.html

Small Business Administration (2000b). Disaster Assistance Mission [1 paragraph]. Available FTP: Hostname: mission.html Directory: www.sba.gov/DISASTER/mission.html

Town of Enfield, Connecticut (1993). Emergency Operations Plan.

Town of Enfield, Connecticut (1994). Legal Notice: Ordinance Establishing the Flood and Erosion Control Board.

Town of Enfield, Connecticut (1995). Zoning Ordinance.

Town of Enfield, Connecticut (1997). Enfield Town Code of Ordinances.

Town of Enfield, Connecticut (1999a). Adopted 1999-2000 Annual Operating and Capitol Budget.

Town of Enfield, Connecticut (1999b). Enfield Plan of Conservation and Development.

Town of Enfield, Connecticut (2000a). Enfield Economic Profile [50 paragraphs]. Available FTP: Hostname: enfield.htm Directory: www.state.ct.us/munic/enfield/enfield.htm

Town of Enfield, Connecticut (2000b). Inland Wetlands and Watercourses Regulations.

Town of Enfield Conservation Committee, Capital Region Council of Governments, The Enfield Planning and Community Development Department (1999). A Program of Action: Open Space and Farmland Preservation in Enfield.

Town of Enfield Department of Public Works (2000). Road 2000 Plan Update.

United States Department of Agriculture, Natural Resources Conservation Service (1989). Beemans Brook Watershed Floodplain Management Study.

United States Department of Agriculture, Natural Resources Conservation Service (1995). Scantic River Erosion Study – Preliminary Design Assessment of Critically Eroding Areas.

United States Department of Agriculture, Natural Resources Conservation Service (1996a). Freshwater and Jawbuck Brook Watersheds Floodplain Management Study, Hydrology and Hydraulics Report.

United States Department of Agriculture, Natural Resources Conservation Service (1996b). Waterworks and Grape Brook Watersheds Floodplain Management Study, Hydrology and Hydraulics Report.

United States Department of Housing and Urban Development (2000). HUD Community Development State Block Grant Fact Sheet [10 paragraphs]. Available FTP: Hostname: statefct.html Directory: www.hud.gov/cpd/satefct.html

Vindigni, Daniel (2000, April 13). Enfield Town Planners Office. Personal correspondence.

**TABLE 1: COMPLETED FLOOD HAZARD MITIGATION
STRUCTURAL PROJECTS**

<u>Associated Watershed</u>	<u>Project Location</u>	<u>Project Description</u>
Boweyns Brook/Connecticut River	Pleasant Road	<i>Remove and replace cross-culvert over Boweyns Brook with associated road construction</i>
Buckhorn Brook	Buckhorn Estates	<i>Storm drainage and outlet improvements at various locations within Buckhorn Estates.</i>
Grape Brook	Park and Harrison Avenues	<i>Reconstruction of drainage system.</i>
Freshwater Brook	Freshwater Pond	<i>Replacement of drainage pipe with vertical standpipe overflow system.</i>
Freshwater Brook	Freshwater Pond	<i>Dredging to increase pond depth and restore recreational benefits.</i>
Miscellaneous Watersheds	Throughout Town	<i>Catch basin cleaning by outside contractor of 5,400 basins within Town.</i>
Miscellaneous Watersheds	Throughout Town	<i>ROAD 2000 program – three year road construction project. Continuing with ROAD 2005.</i>
Scantic River	Green Manor Complex	<i>Replace sidewalks, including curbs and catch basins.</i>
Waterworks Brook	Roosevelt Boulevard Area	<i>Storm drainage improvements including off-road systems, downstream major cross-culverts and backyard swales and ditches.</i>

**TABLE 1: COMPLETED FLOOD HAZARD MITIGATION
STRUCTURAL PROJECTS**

<u>Associated Watershed</u>	<u>Project Location</u>	<u>Project Description</u>
Beemans Brook	Meadowlark Road	<i>Reshape and Replacement of Erosion Control Structure(gabion) at Beemans Brook inlet area and regrading for emergency overflow</i>
Beemans Brook	Montano Road	<i>Subdivision Drainage Improvements including the installation of drainage interceptor system off of Montano Road</i>
Beemans Brook	Old King Street	<i>Storm Drainage Improvements including bridge replacement</i>
Beemans Brook/Scantic River	Post Road	<i>Storm Drainage Improvements including the installation of street drainage system</i>
Beemans Brook	Weymouth Road	<i>Road Reconstruction including the installation of street drainage system and cross culverts</i>
Buckhorn Brook	Michael Drive	<i>Drainage Channel Reconstruction including the piping and channelization of severe erosion problem</i>
Buckhorn Brook	Abbe Road	<i>Road Reconstruction including a bridge replacement at Buckhorn Brook</i>
Freshwater/Grape Brook	Elm Street	<i>Street Reconstruction including box culvert over Freshwater Brook</i>

**TABLE 1: COMPLETED FLOOD HAZARD MITIGATION
STRUCTURAL PROJECTS**

<u>Associated Watershed</u>	<u>Project Location</u>	<u>Project Description</u>
Freshwater Brook	Enfield Memorial Industrial Park	<i>Drainage Channel Improvements</i> including the reshaping and relining of the channel with rip-rap
Freshwater Brook	Shaker Road	<i>Road Widening Project</i> including a new culvert at Jawbuck Brook
Grape Brook	Betty Road	<i>Cross Culvert Reconstruction</i> including the replacement of undersized culverts and reshaping of existing channel
Grape Brook	First and Second Avenue and Third Street	<i>Road Reconstruction</i> including updated storm drainage systems
Grape Brook	Park Avenue	<i>Storm Drainage Reconstruction</i> including the replacement of old undersized storm drainage system
Grape Brook	Virginia Avenue	<i>Storm Drainage and Outlet Improvements</i>
Waterworks Brook	West Forrest Drive	<i>Road Reconstruction</i> including the regrading of road to prevent flooding
Scantic River	Westerly Drive	<i>Cross Culvert Inlet Improvements</i> and clean up of storm debris
Waterworks/Grape Brook	Brainard Road	<i>Road Reconstruction</i> including improvements to Martha=s Pond outlet and outlet improvements off of Fairlane Road

TABLE 2: COMPLETED AND ONGOING FLOOD HAZARD MITIGATION PROJECTS

<u>Objective</u>	<u>Project Description</u>	<u>Progress</u>
Geographical Information Systems: Town-wide Mapping Project	Completion of Town-wide based mapping including all Planimetric and Topographic features, which will assist in identifying areas in need of drainage systems and flood mitigation.	Completed and data is available online
Flood Insurance Policy Seminar	Hour and a half hour program held to educate local homeowners with basic information on flood insurance rates, policies and claims. This program is designed for people with little to no knowledge on flood insurance and policies.	Annual meetings ongoing
Town Staff and Regulatory Board - Flood Hazard Workshop	Hour and a half workshop designed to update town staff and representatives from the regulatory board on flood hazard mitigation strategies.	Annual meetings held
Emergency Management Preparedness Work Group Meeting	Ongoing program held to educate the Emergency Management Team on issues relating to emergency management. Flood hazard emergency response issues will be included in topics to be discussed	Two meetings annually ongoing, with local non-profits in addition to emergency managers
Enfield Insurance Agents Meeting on National Flood Insurance Policies	Informational session, targeting insurance agents with the Town of Enfield, on the current National Flood Insurance Policies required by FEMA. This session is designed to be a more in depth look at Flood Insurance Policies.	Meetings held at various times throughout the year

TABLE 2: COMPLETED AND ONGOING FLOOD HAZARD MITIGATION PROJECTS

<u>Objective</u>	<u>Project Description</u>	<u>Progress Monitoring</u>
Flood Hazard Mitigation Brochure Availability	Availability of flood mitigation and insurance brochures at public accessible places (ie. Town Clerk’s Office or the Planning and Zoning Office).	Availability of brochures on a continual basis; mailed escarpment brochures to residents
Town of Enfield Staff Attendance at Annual Federal Emergency Management Agency Conference	FEMA training seminars in Emmitsburg, Maryland at the Emergency Management Institute. Annual training seminars include Emergency Management, Environmental Reviews, FEMA grant program, and NFIP.	Annual attendance of staff from the appropriate town offices
Leaf Collection Equipment Replacement	Replacement of leaf blowers for Leaf Collection Program, designed to prevent leaves from collecting and blocking storm water drainage areas.	Purchased and implemented
Various Brooks Maintenance/ Cleaning	Ongoing brook/ ditch cleaning and maintenance program at various locations to reduce flooding caused from debris blocking water flow	Ongoing
Culvert Inspection <20'	Inspection and analysis of the structural condition and functional capabilities of major culverts spanning from 5' to 20'	Ongoing

**TABLE 2: COMPLETED AND ONGOING FLOOD HAZARD
MITIGATION PROJECTS**

<u>Objective</u>	<u>Project Description</u>	<u>Progress Monitoring</u>
Catch Basin Cleaning Program	Ongoing Maintenance Program for the continual removal of debris and sediment from the catch basins.	Ongoing

TABLE 3: PLANNED FLOOD HAZARD MITIGATION PROJECTS

<u>Associated Watershed</u>	<u>Planned Mitigation</u>	<u>Project Description</u>	<u>Progress Monitoring</u>	<u>Financial Resources</u>
Beemans Brook	Beeman's Brook III Drainage Project	Correction of drainage/flooding problems in the vicinity of Meadow Lark Road and lower reaches of the Beemans Brook. This is part of a multi-phase construction project in accordance with the Beemans Brook Watershed Study	Pursuing funding opportunities Winter 2007	Potential Flood Hazard Mitigation Grant
Beemans Brook	Oliver Road	Branch pipe replacement under driveway and channel cleaning	Pursuing funding opportunities Winter 2007	Potential Flood Hazard Mitigation Grant
Freshwater Brook	Lynch Terrace Property Acquisition	Acquisition of property with repetitive loss claims		
Scantic River	Sun Street Drainage Outlet	Reconstruct existing storm drainage outlet located between #13 Sun Street and #34 Play Road. Establish an outlet channel to the Scantic River along with major slope stabilization.	Hired consultant to develop plan	Capital Improvement Program Account \$1,290,000

TABLE 3: PLANNED FLOOD HAZARD MITIGATION PROJECTS

<u>Associated Watershed</u>	<u>Planned Mitigation</u>	<u>Project Description</u>	<u>Progress Monitoring</u>	<u>Financial Resources</u>
Scantic River	J.F.K. Middle School Storm Drainage Outlets	Reconstruction and extension of two existing J.F.K. Middle School storm drainage outlets, including stabilization and channel protection. This is one of two high priority projects in Enfield as determined by the NRCS	To be completed in 2008	Capital Improvement Program Account \$200,000
Scantic River	South Maple Street Bridge and approaching roads	Multi-year project which will replace the existing one lane South Maple Street bridge over the Scantic River	Consultant working on plan sin 2007-08	Capital Improvement Program Account \$1,500,000
Scantic River Land Acquisition Project	Ongoing flood plain property acquisition project by the Town of Enfield and the CT Department of Environmental Protection.	Ongoing Project	State has acquired Scantic River Park, Town still pursuing additional properties	Land acquisition to preserve the flood plain and remove houses from areas that are repeatedly inundated by floods