

Strategy for Reducing Risks From Natural Hazards



**West Greenwich,
Rhode Island
2005**

Strategy for Reducing Risks From Natural Hazards in West Greenwich, Rhode Island

Created by: The West Greenwich Natural Hazard Mitigation Committee in consultation
with Resource Specialists, Inc.

ACKNOWLEDGMENTS

Members of the West Greenwich Natural Hazard Mitigation Committee

Detective Michael E. Pfeiler, EMA Director
Kevin A. Breene, Town Administrator
Gary F. Malikowski, Police Chief
Fire Chief David P. Andrews, Public Works
Jennifer Paquette, Town Planner

Map Assistance:

Roland Duhaime, Environmental Data Center, University of Rhode Island

Consultant:

Resource Specialists, Inc., Cumberland, Rhode Island

Adopted by the West Greenwich Town Council: August 3, 2005

ADDITIONAL ACKNOWLEDGMENTS

Donald L. Carcieri,
Governor

MG Reginald A. Centracchio
Director
Rhode Island Emergency Management Agency

Albert A. Scappaticci
Executive Director
Rhode Island Emergency Management Agency

Rhode Island State Hazard Mitigation Committee

Joseph Almedia, Jr.
State Hazard Mitigation Chairman
Rhode Island Emergency Management Agency

David J. Cluley
Senior Engineer
Rhode Island Department of Transportation

Joseph Cirillo
Building Code Commissioner
State of RI Building Commissioner's Office

Paula Pallozzi
Chief Property and Casualty Insurance Rate Analyst
Rhode Island Department of Business Regulations

Peter S. Kent
Peter S. Kent Construction Co.

Raymond A. Allen
Administration & Operations Officer
Division of Public Utilities and Carriers

Michael DiMascolo
Deputy Chief
State Fire Marshal's Office

Eva Zito
State Hazard Mitigation Secretary
Rhode Island Emergency Management Agency

Chris Der Vartanian
Supervisor of Examinations
Rhode Island Dept. of Business Regulations

Richard Snow, P.E.
Chief Civil Engineer
Rhode Island Dept. of Transportation
Bridge Engineering

Grover Fugate
Rhode Island Coastal Resources Mgt. Council

Janet Freedman
Coastal Geologist
Rhode Island Coastal Resources Mgt. Council

Steven Wright
Superintendent
Rhode Island Dept. of Environmental Mgt.
Division of Parks and Recreation

Pamela Pogue
Flood Plain Management Coordinator
Rhode Island Emergency Management Agency

Table of Contents

Section 1.0 Introduction	4
1.1 What Mitigation Can Do For West Greenwich	4
1.2 Mission Statement	4
1.3 Planning Process	4
Section 2.0 Historical Review of Hazardous Events for West Greenwich	5
2.1 Hurricanes	5
2.2 Heavy Rains and Floods	6
2.3 Nor'easters/Snowstorms/Ice	6
2.4 Hailstorms	7
2.5 Wind Events	8
2.6 Lightning Storms	9
2.7 Earthquakes and Forest fires	9
2.8 Hazard Profile Summary	11
Section 3.0 Vulnerability/ Risk Assessment	14
3.1 Population at Risk	14
3.2 Property at Risk	14
3.3 The Economy at Risk	15
3.4 Identifying the Issues	16
3.5 Capability Assessment	16
3.6 Future Development Trends	17
3.7 Risk Assessment Matrix	18
Section 4.0 Mitigation Actions	20
4.1 Action Plan	20
4.2 Strategy Adoption	24
4.3 Implementation, Evaluation and Revision of Strategy	24
References	26
Appendices.	
Appendix A: Technical and Financial Assistance for Mitigation	27
Appendix B: Existing Protection Systems – State and Federal	30
Appendix C: Public Information and Outreach	33
Appendix D: Mitigation Action Progress Form	34
Tables and Maps	
Table 1. Hurricanes	6
Table 2. Floods and Heavy Rains	6
Table 3. Nor'easters/Snowstorms/Ice	7
Table 4. Hailstorms	8
Table 5. Wind Events	8
Table 6. Lightning Storms	9
Table 7. Earthquakes	9
Table 8. Hazard Profile Summary	11
Table 9. Summary of Land Use Changes	17
Table 10. Risk Assessment Matrix	19
Map 1. Risks in West Greenwich	11
Map 2. Critical Facilities in West Greenwich	12

Section 1.0 Introduction

Natural Hazard Mitigation is any sustained action taken to reduce or eliminate long-term risk to people and their property from the effects of natural hazards (e.g. wind, fire, floods, nor'easters, hurricanes, earthquakes, etc.).

Section 1.1 What Mitigation Can Do for West Greenwich

A primary benefit of hazard mitigation is that preventative measures can significantly reduce the cost of post-disaster cleanup. In addition, mitigation actions conducted before hazards occur greatly reduces the impact and costs associated with the aftermath of a hazard event. By planning ahead, West Greenwich will minimize the economic and social disruption that can result from floods, snowstorms, hurricanes and other natural disasters (destruction of property, loss or interruption of jobs and the loss of businesses).

The adoption and implementation of this hazard mitigation plan will assist West Greenwich in receiving assistance from the Federal Emergency Management Agency in pre- and post-disaster assistance such as: FEMA's Community Rating System (CRS), FEMA's Pre-Disaster Flood Mitigation Assistance (FMA) Program, and FEMA's Post-Disaster Hazard Mitigation Grant Program (HMGP).

The Town of West Greenwich currently does not participate in FEMA's Community Rating System (CRS) Program. FEMA's Community Rating System (CRS) Program would allow residents of the Town to gain credit points that would result in discounts on National Flood Insurance (NFIP) premiums. FEMA's Pre-Disaster Flood Mitigation Assistance Program makes grants available for communities to implement flood mitigation planning and activities such as acquisition, relocation, and retrofitting of structures. This program is made available only to communities having a pre-existing approved hazard mitigation plan. FEMA's Post-Disaster Hazard Mitigation Grant Program is made available only for communities after a federally declared disaster. Having an approved mitigation plan expedites the application process for pre- and post-federal mitigation funding, and ensures a funded project is eligible and feasible.

Section 1.2 Mission Statement

Preserve and enhance the quality of life, property and resources by identifying areas at risk from natural hazards and implementing hazard mitigation actions to protect the town's population and infrastructure as well as the historical, cultural and natural resources of the community.

Section 1.3 Planning Process

Several meetings were held by committee members throughout the summer and fall of 2004 to review the original Plan that was completed in November 2000 as well as the feedback received from FEMA. During the process, changes were made to the original Risk Assessment Matrix to reflect changes that have taken place since the original

writing of the Plan. For example, the communication problems at the Public Safety Dispatch center as well as the fire detection systems at Town Hall have been addressed and rectified since the last Plan. Furthermore, some items were removed that the Committee did not feel were as great a risk to the Town.

During the Planning process, two public meetings were held to receive input from the community (see Appendix C). The first meeting was held August 10, 2004 to review the draft plan and the second meeting was held November 3, 2004 to receive public input prior to Council approval. Finally, when the Town Council approved this Plan via Resolution on August 3, 2005, public comments were also welcomed at that time.

Section 2.0 Historical Review of Hazardous Events for West Greenwich

To profile the history of these events, the National Climatic Data Center's on-line database was utilized since this is the most comprehensive source for past weather events. Any event that has historically affected the community, has affected the entire community in the same manner.

The following hazards have been identified for the Town of West Greenwich: Hurricanes; Heavy Rains/Flooding; Nor'easters/Snowstorms; Hailstorms; Wind Events; Lightning Storms; Earthquakes and Forest fires.

Section 2.1 Hurricanes

Although Rhode Island has not been hit by extremely intense hurricanes (Category 4 or 5) as seen in other parts of the East Coast, we have had our share of major hurricanes that have caused extensive damage to our State. In the sixteen year period from 1938 to 1954, Rhode Island experienced three major hurricanes that caused a tremendous amount of damage and resulted in almost 300 deaths across the State. The great un-named hurricane of 1938 devastated Rhode Island and caused \$100 million dollars in property damage and took 262 lives. Hurricane Carol in August of 1954 caused similar damage dollar-wise, but thankfully only resulted in the loss of 19 lives. Even though Rhode Island has not had hurricanes as severe as this in the last 50 years, we have had several that have resulted in millions and millions of dollars in property damage, mostly due to the fact that people like to live near the water and are naïve to the fact that even a small hurricane can wreak havoc on lives and property. The wind and rain that precede a hurricane can cause severe damage even to those communities that are further inland, such as West Greenwich. Therefore, the threat of a hurricane to this community and the resulting wind and rain damage need to be considered.

Table 1 – Significant Hurricanes in Rhode Island

Date	Name	Category ¹	Winds (mph)	Property Damage (\$million)	Deaths
September 21, 1938	N/A	3	95	100	262
September 14, 1944	N/A	3	82	2	0
August 31, 1954	Carol	3	110	90	19
September 11, 1954	Edna	3	40	0.1	0
September 12, 1960	Donna	2	58	2.4	0
September 27, 1985	Gloria	2	81	19.8	1
August 19, 1991	Bob	2	63	115	0

Source: National Climate Data Center

Section 2.2 Heavy Rains and Floods

Although West Greenwich is not considered a flood-prone community, there are several ponds and rivers in the community that are prone to flooding that place cultural, historical and economic resources at risk. Most flood damage primarily affects low-lying bridges and those homes located in a 100-year flood zone.

Table 2 – Significant Heavy Rain/Flooding for Kent County

Date	Rainfall (inches)	Comments
June 14, 1998	6"-8"	The Pawtuxet River reached flood stage in Warwick, no damage reported
June 19, 1998	n/a	Flooding in Coventry when streams overflowed their banks
September 16, 1999	2"-5"	Pawtuxet River rose out of its banks but no damage reported, also flooding in low-lying areas was common
April 22, 2000	2"-3"	Minor street flooding occurred, but no damage was reported
August 13, 2003	n/a	Minor street flooding reported

Source: National Climate Data Center

Section 2.3 Nor'easters/Snowstorms

Historically, significant snowstorms for West Greenwich have resulted in the closing of schools/businesses, power outages, fallen trees/wires, poor road conditions and several roofs collapsing (See Table 3). One of the most severe snowstorms recorded for Kent County occurred January 7, 1996, "the blizzard of '96". Coventry experienced the largest accumulation of snow, recorded at 27 inches. This severe storm disrupted transportation systems, closed schools/businesses and damaged commercial and residential property. During the following week, several roofs of commercial and residential buildings collapsed from the snow.

¹ Category 1 74-95 mph winds, 4'-5' storm surge; Category 2 96-110 mph winds, 6'-8' storm surge; Category 3 111-130 mph winds, 9'-12' storm surge; Category 4 131-155 mph winds, 13'-18' storm surge; Category 5 winds greater than 155 mph, with a storm surge of greater than 18' source: Saffir-Simpson Hurricane Scale.

Table 3 – Significant Nor’easters/Snowstorms for Kent County

Date	Snowfall (inches)	Comments
December 14, 1995	4”-6”	Schools and businesses closed early, evening commute adversely affected
December 19, 1995	6”-10”	Most schools and some businesses closed the day after the storm
January 2, 1996	10”-12”	Snowfall at the rate of .5” to 2” per hr., most schools closed the next day
January 7, 1996	24”-27”	Heavy snow disrupted transportation systems, closed schools, stores and businesses. Most significant winter storm to hit southern NE in past 20 years. Heavy snow collapsed roofs of commercial and residential structures
February 16, 1996	5”-7”	Highway travel seriously disrupted for the afternoon rush hour, no damage reported
March 2, 1996	6”-11”	Numerous skidding accidents reported on area highways
March 7, 1996	7.5”	Numerous minor skidding accidents
April 7, 1996	6”-8”	Heavy, wet snow, no significant travel problems
April 9, 1996	16”-21”	Heavy, wet snow stuck to trees and power lines causing scattered power outages, less snow accumulated on pavements
December 6, 1996	7”-11”	Scattered power outages and poor road conditions
January 11, 1997	4”-7”	Rates up to two inches per hr., minimal effects on travel
April 1, 1997	24”	Heavy snow and strong winds caused blizzard conditions, travel just about impossible at height of storm, tree limbs and wires downed, schools closed for 2 days, power outages
February 25, 1999	8”-12”	Schools closed early, hazardous road conditions
March 15, 1999	7”-12”	Poor traveling conditions, schools and businesses closed
February 18, 2000	6”-8”	Snarled traffic on major highways and created treacherous driving conditions
December 30, 2000	6”-8”	Storm fell on a Saturday so no major traffic problems
January 20, 2001	6”-8”	Storm fell on the weekend so no major traffic problems
March 5, 2001	6”-10”	Heavy snow and strong winds, power outages, schools/businesses closed for several days in some communities
November 27, 2002	8”	Several minor accidents reported, but most people traveled a day early for Thanksgiving in anticipation of the storm
December 5, 2002	7”	No storm damage or injuries reported
February 7, 2003	6”-12”	No significant storm damage, main impact was to travel
February 17, 2003	12”-24”	Storm fell on Presidents Day so travel impact was minimal, some minor accidents due to slippery roads
March 6, 2003	6”-10”	Dozens of minor accidents due to poor visibility and slippery roads
December 5, 2003	12”-24”	Major disruption to transportation systems, dozens of minor accidents

Source: National Climate Data Center

Section 2.4 Significant Hailstorms

Hailstorms are usually associated with severe thunderstorms accompanied by high winds. The National Climate Data Center reports several hailstorms that have affected Kent County in the past with hail ranging in size from .75” to 1.75”.

Table 4 – Significant Hailstorms for Kent County

Date	Magnitude (size in inches)	Comments
July 14, 1956	1.75"	None available
July 2, 1964	1.75"	None available
May 30, 1979	1.75"	None available
June 20, 1995	.75"	None available
August 4, 1995	.75"	None available
June 22, 1997	1"	Hail was produced by a line of severe thunderstorms
June 19, 1998	.75"	Dime sized hail fell, no damages reported
July 25, 1999	1"	Hail as large as quarters fell in West Greenwich
May 24, 2000	.75"	Dime sized hail reported in West Greenwich
June 11, 2000	.75"	No damage reported
July 18, 2000	1.75"	Golf ball sized hail fell in W. Warwick and traffic on I-95 was momentarily snarled as the storm passed
August 16, 2000	.75"	Dime sized hail reported
June 19, 2002	.75"	Dime sized hail reported

Source: National Climate Data Center

Section 2.5 Significant Wind Events

National climatic events such as high gale winds, tropical storms, thunderstorms, nor'easters, hurricanes, and low-pressure systems produce wind events in Rhode Island. Damages from winds events range from power outages, property damage to vehicles and buildings to fallen trees/limbs. Wind events in West Greenwich have resulted primarily in power outages and downed tree limbs with minimal property damage.

Table 5 – Significant Wind Events for Kent County

Date	Magnitude (kts or mph)	Comments
January 4, 1994	Gusts to 40 mph	No reports of wind damage
January 7, 1995	Gusts +50 mph	No reports of wind damage
January 19, 1996	40-60 mph gusts	Minor property damage, scattered power outages due to falling tree limbs
January 27, 1996	55 mph	No reports of wind damage
February 25, 1996	60-80 mph gusts	Trees and limbs downed, some shingles blown off roofs, power outages
July 13, 1996	Gusts to 60 mph	Tropical Storm Bertha brought high winds to the area with no damage reported
March 6, 1997	50-62 mph	Property damaged by falling trees and limbs, scattered power outages
March 31, 1997	30-40 mph gusts	Widespread power outages
August 8, 1997	40+ mph gusts	Minor damage reported due to falling tree limbs
November 11, 1997	60 mph gusts	No damage reported
February 24, 1998	40-56 mph gusts	Strong winds associated with a nor'easter, no damage reported
March 9, 1998	40-55 mph gusts	Scattered
July 23, 1999	50 mph gusts	Tress, large branches and wires were downed by thunderstorm winds
November 2, 1999	50-60 mph gusts	Several large trees, limbs and power lines downed
December 17, 2000	60 mph gusts	Downed trees, limbs and power lines, scattered power outages
November 13, 2003	50-60 mph gusts	Brought down trees and power lines

Source: National Climate Data Center

Section 2.6 Significant Lightning Storms

The National Climate Data Center does not list any significant lightning storms for West Greenwich specifically, but there has been documented damage in other areas of Kent County as shown in Table 6. Furthermore, this does not mean that the community is not at risk from the effects of lightning. Thunderstorms are a common occurrence in this community and the results of lightning strikes can be scattered power outages, house fires, forest fires and damage from trees being struck by lightning.

Table 6 – Significant Lightning Storms for Kent County

Date	Magnitude	Comments
June 14, 1994	n/a	Lightning strikes started house fires and knocked out the main alarm system of the West Warwick Fire Dept., several other lightning strikes caused minor damage throughout the area
August 5, 1994	n/a	No damage reported
June 22, 1997	n/a	Frequent cloud to ground lightning, lightning started a fire in an historic clock tower in Warwick and a fire in E. Greenwich, most likely caused by lightning, resulted in the evacuation of 75 residents
November 9, 1997	n/a	A garage was struck in Warwick Neck and at a Warwick church a 10' concrete cross was struck by lightning which sent it crashing to the roof below
March 9, 1998	n/a	Lightning struck a garage and the fire that resulted spread to the house nearby in West Warwick

Source: National Climate Data Center

Section 2.7 Earthquakes and Forest Fires

Although Rhode Island is not prone to major earthquakes, we do have our share of them. Thankfully most quakes in and around RI are usually only felt as a slight rumble lasting several seconds or less. The most recent earthquake centered in RI was on October 6, 2003 in West Warwick. This quake had a magnitude of 1.8 on the Richter Scale of 1 to 10 (10 being most severe). Most quakes that are felt in Rhode Island are not centered in the State, but in surrounding States (see Table 7). Therefore, earthquakes do need to be considered as a hazard to our community but with low priority.

Table 7 – History of Earthquakes in Rhode Island

Date	Point of Origin	Impact on RI
February 28, 1925	St. Lawrence River region	Intensity V effects felt on Block Island and in Providence. Intensity IV effects felt in Charlestown
November 19, 1929	Grand Banks of Newfoundland	Moderate vibrations felt on Block Island and in Chepachet, Newport, Providence and Westerly
November 1, 1935	Quebec, Canada	A magnitude of 6.25 with intensity IV felt on Block Island and in Providence and Woonsocket
December 20 & 24, 1940	Lake Ossipee, NH	Intensity V effects knocked pictures off walls in Newport. Intensity IV effects were felt at Central Falls, Pascoag, Providence and Woonsocket. Intensity I-III effects were felt at Kingston, New Shoreham and Wakefield.
September 4, 1944	Massena, NY	Intensity I-III was reported in Kingston, Lonsdale, Providence, Wakefield and Woonsocket
October 16, 1963	Coast of Massachusetts	A magnitude 4.5 quake caused Intensity V to be felt in Chepachet with reports of some cracked plaster.

		There were also reports of rattling windows and dishes and rumbling earth sounds. Other Northern RI locations felt the tremor, but with less intensity.
December 7, 1965	Unknown	Windows and doors shook in Warwick and furniture and small objects moved in Bristol.
February 2, 1967	Unknown	A magnitude 2.4 created intensity V effects in Middletown, Newport, North Kingstown and Jamestown. No damage reported.
February 3, 1973	Unknown	Explosion like or sonic boom noises were heard throughout RI and houses and windows shook, but nothing was reported by seismographs.
June 14, 1973	Western Maine	Intensity IV effects felt at Charlestown and Intensity I-III felt at Bristol, E. Providence, Harmony and Prov.
October 6, 2003	West Warwick	A magnitude of 1.8 caused minor shaking in the community, no damage reported

Source: US Geological Survey; Earthquake History of Rhode Island

Forest Fires are another risk to West Greenwich, especially considering that there are large areas of forest and brush and many of these areas are adjacent to residential developments. To further add to this risk is the fact that access to the large forested areas is minimal at best and needs to be addressed to increase access and response time.

Section 2.8 Hazard Profile Summary

This Hazard Profile Summary lists the specific hazards that have and can affect West Greenwich along with specifics regarding frequency of occurrence, magnitude (% of community affected), speed of onset (warning time available), seasonal pattern, possible affects to the community and risk priority.

Table 8 – Hazard Profile Summary

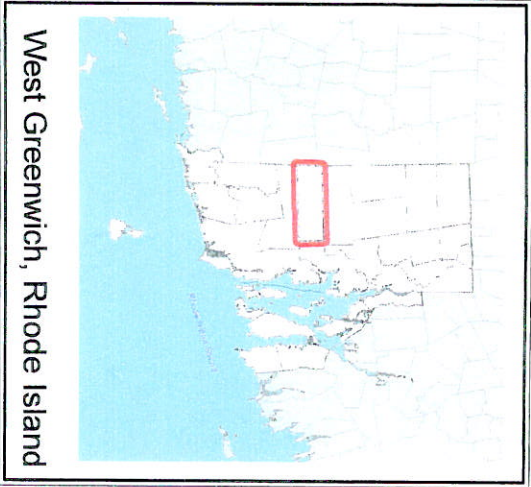
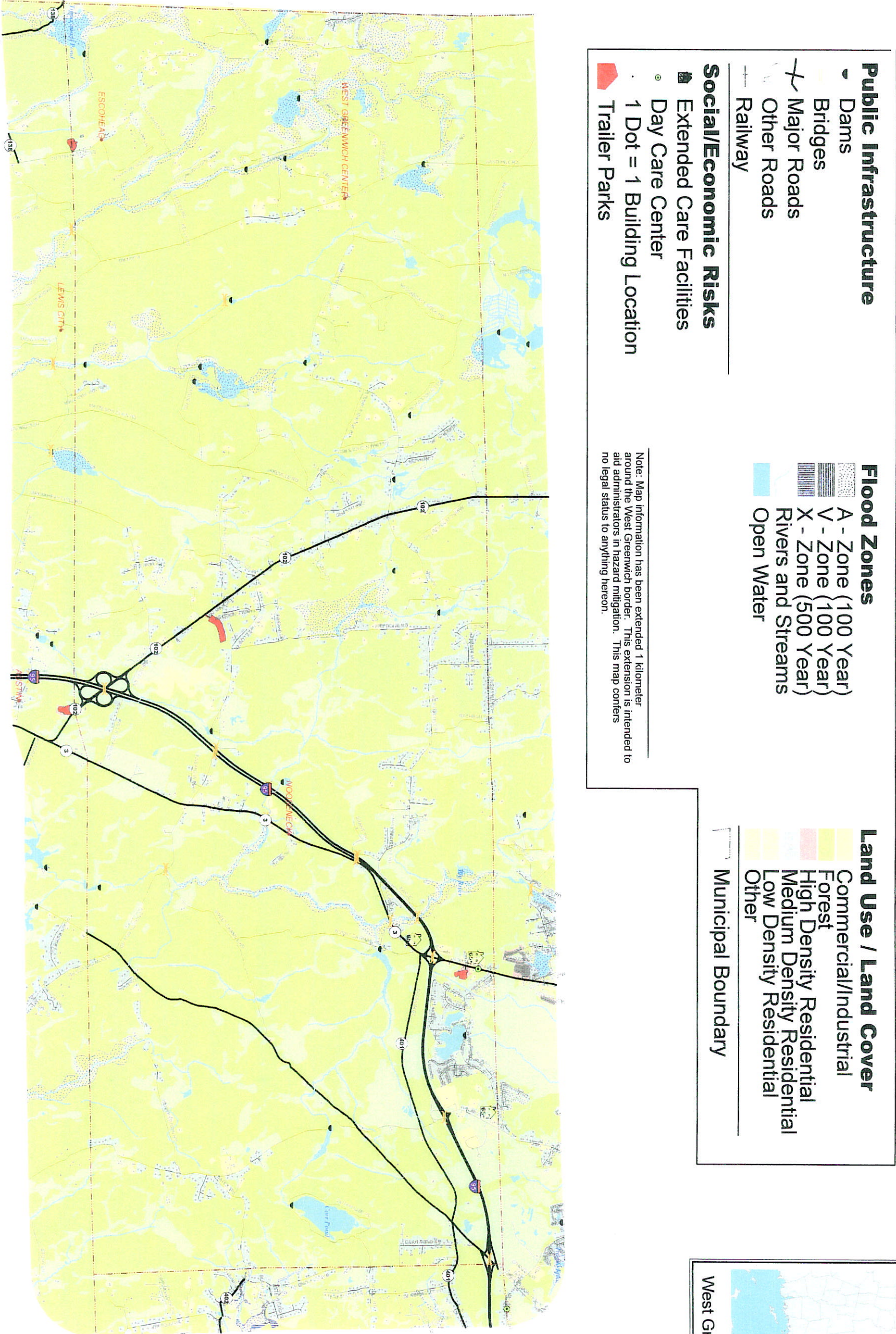
Hazard	Frequency ²	Magnitude ³	Speed of Onset	Seasonal Pattern	Possible Affects	Risk Priority
Hurricane	Likely	Limited	24+ hrs.	June-Nov. with Aug. & Sept. most likely	Flooding, downed trees, power outages, property damage, loss of life	Medium
Heavy Rains Flooding	Highly likely	Limited	12-24 hrs.	Spring and Summer	Flooding, property damage, roads closed, dams breached	Medium
Nor'easter Snowstorm	Highly likely	Critical	12-24 hrs.	Winter	Power outages, poor travel conditions, schools/businesses closed	High
Hail	Possible	Negligible	Minimal	Summer	Property damage	Low
Wind event	Highly likely	Critical	12-24 hrs.	Any Season	Property damage, power outages, downed trees and limbs	High
Lightning	Highly likely	Negligible	6-12 hrs.	Spring, Summer, Fall	Property damage, fire	Medium
Earthquake	Possible	Critical	Minimal	Any Season	Loss of life, property damage, power outages	Low
Wildfire	Possible	Limited to Negligible	Minimal	Any Season	Property damage, environmental damage	Medium/High

² Highly likely=near 100% probability within the next year; Likely=between 10% and 100% probability within the next year or at least one chance in next 10 years; Possible=between 1% and 10% probability within the next year or at least one chance in next 100 years; Unlikely=less than 1% probability in next 100 years

³ Catastrophic=more than 50% of community affected; Critical=25% to 50% affected; Limited= 10% to 25% affected; Negligible=Less than 10% affected.

Risks In West Greenwich

Map 1

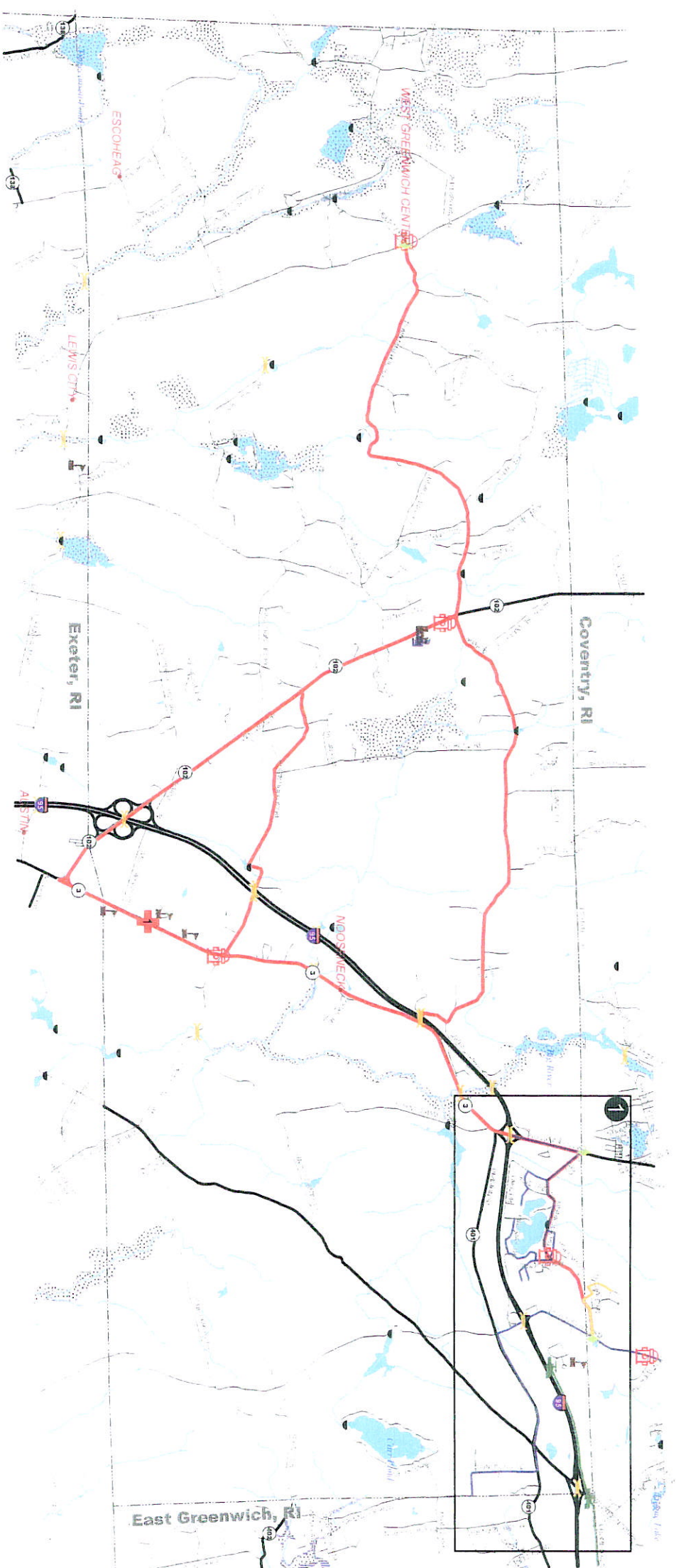
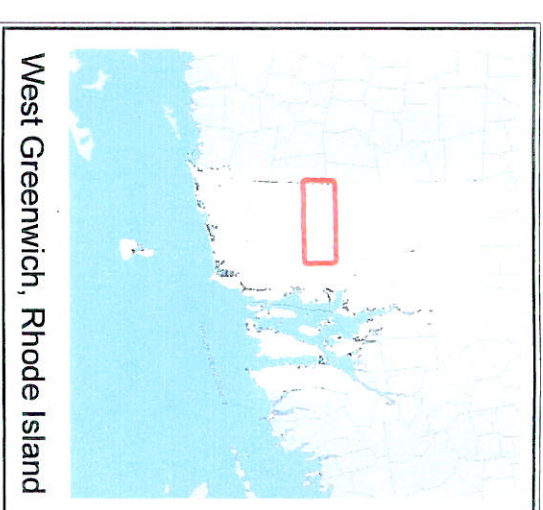
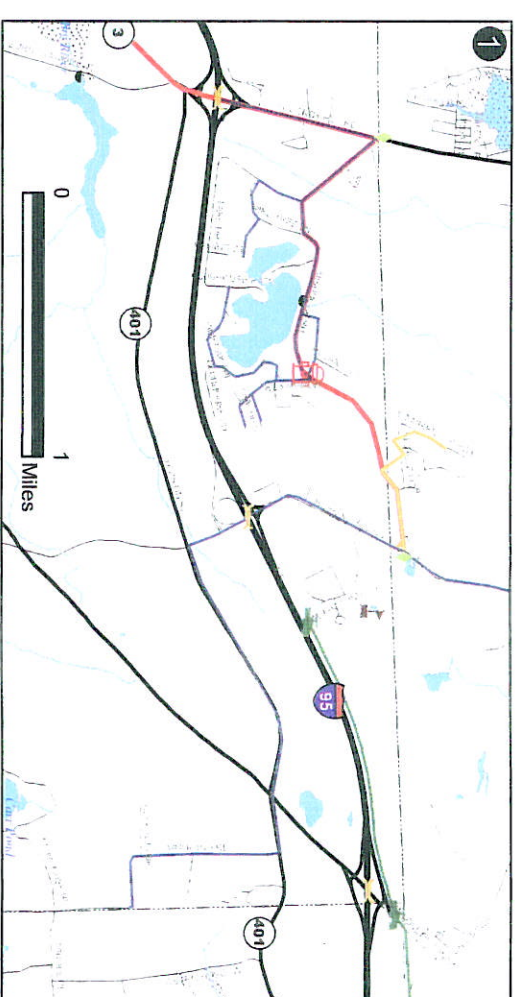
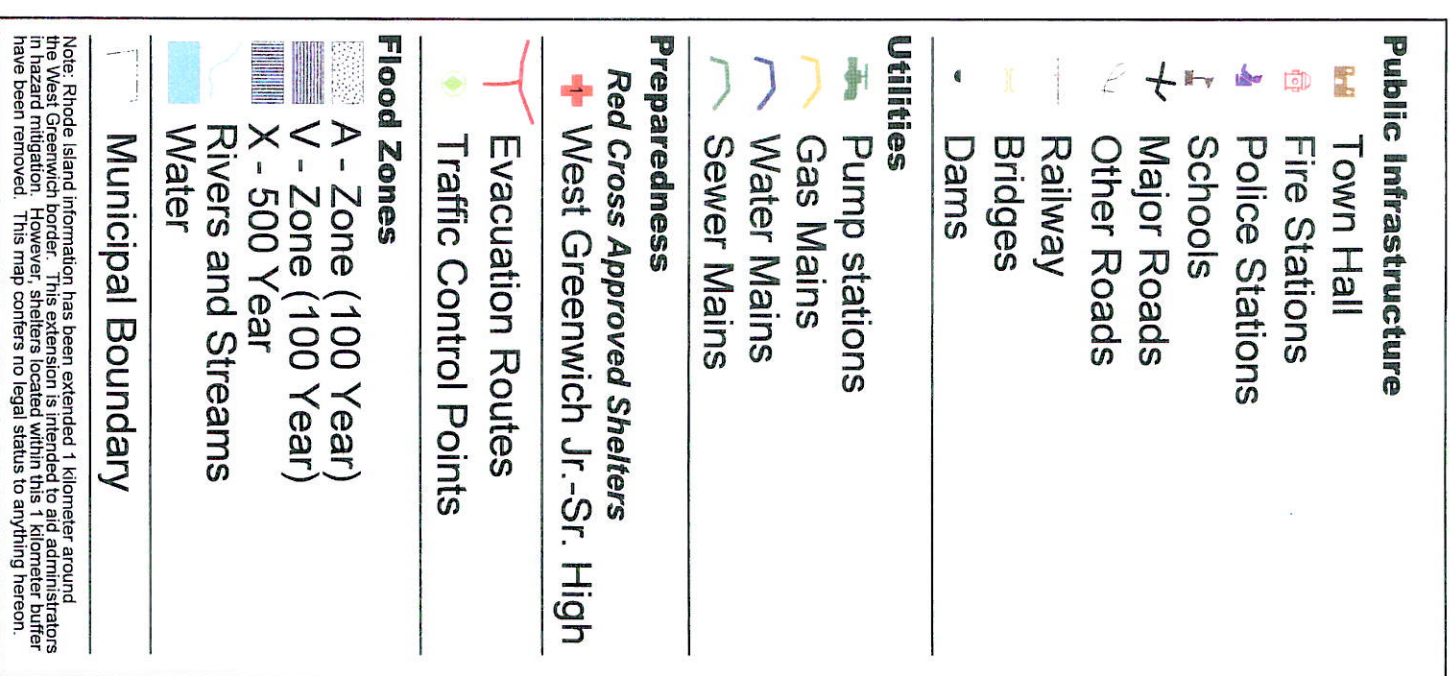


West Greenwich, Rhode Island



Critical Facilities In West Greenwich

Map 2



Section 3.0 Vulnerability/ Risk Assessment

This section focuses on assessing the community's risk and vulnerability. It will identify what areas are at risk, how vulnerable those areas (e.g., structures, population or natural resources) are and what the impacts (loss of life, environmental damage or inconvenience to residents) will be if those areas are affected by a natural disaster. The risk matrix (Table 10) summarizes the major risks to West Greenwich.

With the help of the university of Rhode Island (URI) Environmental Data Center, West Greenwich mapped high-risk areas in the Town. Map 1: Risks in West Greenwich, indicates public infrastructure (dams, bridges, major roads), social/economic risks, land use/land cover, flood zones, repetitive loss areas and areas of historic flooding (not marked on the FEMA Flood Insurance Rate Map). Map 2: Critical Facilities in West Greenwich, indicates public infrastructure (Town Hall, Fire Stations, Police Station and schools), utilities, critical facilities, evacuation routes and American Red-Cross approved shelters.

Section 3.1 Population at Risk

The use of mass care facilities during an emergency is dependent on a variety of variables. These variables include warning time, public awareness of the hazard, levels of encouragement from public officials, and the availability of shelters. Exeter-West Greenwich Jr./Sr. High School is the only shelter that is an American Red Cross approved shelter, with a capacity of 624 people. Furthermore, Hianloland Fire Dept, Station #2 (capacity 25); Lake Mishnock Fire Department (capacity 25); and West Greenwich Rescue Co., #2 (capacity 25) can also be utilized to provide the Town with additional shelter space when required. However, it is important to note that the Town experienced an increase in population of over 59% between 1990 and 2000. Therefore, as the Town continues to grow, the need for sufficient emergency shelter will also increase and actions to address this need must be proposed.

Section 3.2 Property at Risk

The 100-year flood (base flood) is an event that has a one-percent probability of happening in any given year and is the storm event used to identify the flood zones, which impact zoning and building requirements throughout the Town. Flood ordinances have regulated development in flood plains and mandated structures lowest floor elevation to be above the 100-year base flood elevation. Some portions of the Town experience frequent street flooding during heavy rain. In addition, there are several dams in town that if breached could also pose a potential threat to properties in the vicinity as well as downstream from these dams if they were to fail.

FEMA lists that 3 properties in West Greenwich are insured by the NFIP with a total value of almost \$450 thousand as of December 31, 2003. From 1978 through 2003, there were no losses in West Greenwich through the NFIP.

The majority of flooding problems within the Town of West Greenwich stems from street flooding in poor drainage areas.

In addition to flood hazards, property in West Greenwich is also at risk from wind events, lightning strikes and forest fires. Winter storms and Nor'easters cause high winds in the winter months and severe thunderstorms are prevalent in the spring and summer seasons which produce high winds and frequent lightning. Tropical events or hurricanes also provide high winds and lightning in late summer and fall. Most damage that occurs to property from these hazards is due mainly to fallen trees and limbs and power lines. These affects alone are a hazard; however, an additional hazard is created when the power lines are knocked down since many residents rely on private wells for water. Loss of electricity from hazardous events results in individual wells ceasing to operate, therefore, loss of electricity is more than a mere inconvenience for the residents of West Greenwich.

Additionally, a major concern is that rapid residential development, as noted earlier with the increase in population, may result in an insufficient public water supply and pressure for adequate fire protection. Forest fires not only pose a threat to current residents and property, but also to future residents. The future prosperity of the Town may be jeopardized if adequate measures are not taken to address the current impacts of growth, specifically, the Town's ability to provide adequate fire protection.

Section 3.3 The Economy at Risk

Although many of the residents of West Greenwich commute to job outside the community, there are several areas of manufacturing and industry within this community as well as numerous smaller businesses that would be severely affected if a natural disaster were to occur. Also, approximately 86 percent of the Town's revenue is generated from property tax (63 percent from residential and 23 percent from commercial). Should any of the tax base be destroyed by a hazardous event, the immediate effect would be that remaining property owners would carry an increased financial burden with regards to property taxes. It is an obvious course of action for the Town to protect both persons and property from natural disasters. However, as West Greenwich's population continues to grow, so does the burden of protecting persons and property. The drafting of new codes and regulations will help lessen potential damage caused by a hazardous event and an interruption of the local stream of commerce. These codes range from building codes and design standards to subdivision regulations. The commercial area of West Greenwich most affected by a potential hazardous event would be the Technology Park off Hopkins Hill Road. Nearly 3,000 persons are employed by: G-Tech Corporation, Amgen Pharmaceutical and Centrex Corporation. Any disruption to this area from a hazardous event would have worldwide ramifications on the products produced here.

Section 3.4 Identifying the Issues

The West Greenwich Hazard Mitigation Committee assessed the Town's risk to natural disasters in terms of population, property, economic resources and probability of occurrence. The committee considered public health/safety, structural damage, area or town-wide evacuation and structures that house people with special needs. The committee began by identifying specific areas and structures that are vulnerable to natural hazards specific to West Greenwich.

Vulnerable areas were determined by considering past and potential natural hazards that pose a threat to the population, property and economic resources of the Town. Second, the committee determined the primary problem of the natural hazard event, such as loss of life, public safety, property damage, power outages and economic hardships.

Third, the Committee determined the objective that could be realized by implementing an appropriate mitigation action. Objectives included protection of the public, economic stability and decreasing the frequency of interruption of utility services. Finally, the Committee prioritized each action using criteria based on protection of life and property, social/economic hardship, critical infrastructure and public safety. After the vulnerable areas were identified and assigned, the Risk Assessment Matrix (Table 10) was constructed which ranks the vulnerable area.

Section 3.5 Capability Assessment

This capability assessment refers to the existing plans, programs and policies that have incorporated hazard mitigation or other proactive tools.

In March 2004 the Town completed its most recent update of their Comprehensive Plan. West Greenwich's Comprehensive Plan identifies actions that can be taken to address increased development pressures, economic stability, open space and recreation issues, and public infrastructure and facilities. It outlines goals, policies, issues, and actions to provide a framework for everyday operations within the Town. West Greenwich recognizes the importance of incorporating mitigation initiatives (both Pre- and Post-Disaster) into the Comprehensive Plan and will incorporate this Natural Hazard Mitigation Plan as an appendix to its present Comprehensive Plan once approved.

The Town implements and enforces the State Building Code, however, it does not currently participate in FEMA's Community Rating System (CRS) Program. Participation in FEMA's Community Rating System Program would allow flood insurance policy holders a 10% discount on their premiums, and is suggested in the mitigation actions section of this plan.

The Town recently updated its Emergency Operations Plan (EOP). This plan addresses the response to extraordinary emergency situations associated with natural, man-made, and technological disasters. The Town's Emergency Operations Plan further addresses pre- and post-disaster strategies to affectively deal with the hazards addressed in this plan

such as hurricane and flooding evacuation, public warning and sheltering during natural disasters.

Section 3.6 Future Development Trends

As with all the other communities in Rhode Island, West Greenwich continues to grow in terms of new residential development and total population. In the period from 1990 to 2000, there was an increase of 557 housing units in the community. This type of growth not only consumes more land, it also lends itself to more school age children being brought into the Town which can cause a strain on the already crowded schools. Commercial/Industrial development was also on the rise in West Greenwich during this time frame, but at a much slower pace. This type of development brings with it more employment opportunities, but also increases the daytime population, that along with the residential population may need to be evacuated and sheltered during a natural disaster.

Table 9 Land Use

Land Use	Current figures	
	Acres	Percent
Rural, Farming, Residential (RFR1)	485	1.5
Rural, Farming, Residential (RFR2)	18,110	55.3
Neighborhood Business (NB)	9	less than 0.1
Highway Business (HB)	279	0.9
Industrial A (IA)	472	1.4
Industrial B (IB)	273	0.9
Open Space Public Land	13,127	40.0
Total Land in West Greenwich	32,755	100.0

With large parcels of undeveloped land available in West Greenwich, it appears that the population and new developments will continue. It will be the task of the community to slow the growth if the rural character of the community is to remain. Furthermore, the fact that the fire departments are only staffed on a volunteer basis will have to also be further reviewed as the Town grows in order to properly protect the community.

Preservation of Wetlands

The environmental and economic values of wetlands are endless, and becoming more realized over time. Wetlands play an important role in flood control. Wetlands collect and detain flood waters, reducing their force and destructiveness, which is readily apparent in southern states where over fifty percent of wetlands have been eliminated. Wetlands also provide a valuable, natural service regarding water quality. Wetlands absorb and filtrate pollutants that could otherwise degrade the quality of water in rivers, lakes, and ponds. Wetlands provide necessary spawning/rearing habitat and food supply for freshwater fish. Wetlands also provide the critical habitat for most waterfowl, as well as an enormous diversity of plants and animals. Additional benefits of wetlands include: groundwater recharge, erosion control, land formation, and recreation.

Section 3.7 Risk Assessment Matrix

The Town of West Greenwich Natural Hazard Mitigation Committee in reviewing the natural hazards that can impact the town, completed the following Risk Assessment Matrix (Table 10). In completing this matrix, the committee identified areas in town that are at risk and are vulnerable to costly damage and loss of life. The vulnerable areas have been ranked by which mitigation strategy would produce the most benefit for the town and its residents.

Table 10.0 Risk Assessment Matrix

Rank	Vulnerable Area	Risk Area	Location	Ownership	Natural Hazard	Primary Problem or Effect	Mitigation Benefits	Risk Historic = H Potential = P
1	Dams	1	Town-wide	Public and Private	Hurricane Flood	Damage of property Economic hardship	Prevent/minimize damage to property Decrease or eliminate economic hardship	H
2	Tree Damage	1 & 2	Town-wide	Public and Private	Hurricane Windstorm Ice Storm Nor'easter	Downed power lines/outages Loss of drinking water/heat Loss of communications	Maintain power during/after event Maintain drinking water and heat Maintain communication systems	H
3	Access points to large wooded areas	3	Town-wide	Public and Private	Fire	Loss/Damage to lives and property Economic/social hardship	Access to source of fires Prevent/minimize loss or damage to lives and property Decrease/eliminate economic and social hardship	P
4	Local Roads Subject to Flooding	1	Mishnock Road Club House Road Hazard Road Plain Road	Public	Hurricane Heavy Rain	Loss/ damage of lives and property Disruption of evacuation routes Costs of cleanup	Public safety Maintain evacuation routes Decrease costs of cleanup	H
5	Residential Homes	1, 2 3, 4	Town-wide	Private	Hurricane Wind Event Earthquake Fire Earthquake	Economic and social hardship Town unprepared for multiple/large-scale fire	Public safety Prevent or minimize economic and social damage	H & P
6	Mobile Home Park	1, 2 3, 4	Greenwich West Oak Embers Blueberry Heights	Private	Hurricane Windstorm Fire	Loss of life and property Additional time needed for evacuation Elderly population dependent on electricity	Public safety Expedite evacuation	H & P

Section 4.0 Mitigation Actions

In completing the risk and vulnerability analysis, the West Greenwich Natural Hazard Mitigation Committee considered projects and actions that would reduce the town's vulnerability to the identified hazards. The Risk Assessment Matrix presented in Table 10 is the basis for the mitigation actions presented in Section 4.1. The Committee considered the following actions as the objectives to meet the goals of this plan and prioritized the matrix and the associated actions based on the following criteria: protection of life and property, social/economic hardship, critical infrastructure and public safety. Goals and objectives were aligned to public health risks, evacuation and mass care considerations, disruption of essential services and potential economic losses to the Town.

The West Greenwich Hazard Mitigation Committee determined that the identified objectives could be met by considering actions aligned to the following:

- Planning and Regulations
- Property Protection, Structural Projects and Maintenance (acquisition, elevation, flood gates, sewers, repairs)
- Public Information and Outreach, Incentive Programs
- Emergency Services (Protection of Critical facilities)
- Post Disaster Opportunities

This Committee has worked to set goals and objectives that are bounded by a time frame and are compatible and consistent with State Hazard Mitigation Goals. Upon submittal of this plan to RIEMA, the State Hazard Mitigation Committee (SHMC) is expected to review and approve these goals and objectives to ensure consistency with the statewide goals and objectives. The time frame used for this strategy is as follows:

- Short Term = 0 to 6 Months
- Medium Term = 6 to 18 Months
- Long Term = 18 Months to 5 Years

Section 4.1 Action Plan

The following actions use the Risk Assessment Matrix (Table 10) to identify areas at risk, offer mitigation strategies and consider benefits to the community with each action taken. Each action offers a discussion of the project and if applicable, includes the options considered. Multiple actions associated with a vulnerable area reflect Town priorities and are simply prioritized high, medium, or low. If known, the actions include cost estimations and assign responsible parties to lead the efforts to complete the action. Other relevant departments/agencies that can offer support to the project are also identified, as well as funding options.

Risk Area # 1 – Goal: Protect present and future property and citizens from the effects of flooding.

Action 1 – Identification of Dam Owners and Inspection of Dams – High priority.

- a) Identification of dam owners to ensure proper maintenance and structural integrity.

Responsible Parties: Tax Assessor and Public Works Director

When: Short-term

Resources Available: Town annual budget

Benefit: Maintain continued responsibility of dam owners

Estimated Cost: No additional cost

- b) Inspection/evaluation of dams after identification of owners; prioritize by likelihood of failure and potential damage caused.

Responsible Party: Public Works Director

In Coordination With: Fire Departments

When: Medium-term

Resources Available: RI DEM, Town annual budget

Benefit: Reduce/eliminate dam failure, protection of life and property

Estimated Cost: No additional cost

Action 2 – Review Comprehensive Plan for Drainage Requirements – Medium priority.

- a) Review comprehensive plan to ensure adequacy of design standards to meet drainage requirements. Propose revisions to meet drainage requirements. Implement consistent maintenance program for storm drains in order to minimize flooding from storm water run-off.

Responsible Party: Town Planner

In Coordination With: Planning Department, Public Works Department and Town Engineer

When: Medium-term

Resources Available: Town annual budget

Model: Engineering design manuals

Benefit: Reduce further areas subject to flooding and improve those areas that are already flood-prone

Estimated Cost: No additional cost

Action 3 – Replacement of Undersized Culverts – Medium priority.

- a) Evaluate the feasibility of replacing current undersized culverts with larger or properly sized culverts.

Responsible Party: Director of Public Works

In Coordination With: Department of Public Works

When: Long-term

Resources Available: State and Town funding
Model: City of Warwick Department of Public Works
Benefit: Increase drainage; reduce flooding
Estimated Cost: Unknown

Action 4 – Develop a Debris Management Plan – High priority.

- a) Fallen debris and tree limbs resulting from thunderstorms, hurricanes, ice storms and windstorms collect under bridges and dams and block storm culverts. Prompt removal and proper disposal of this material decreases potential of road and property flooding. A comprehensive tree-trimming plan (see below) will minimize potential impacts in addition to decreasing the costs of cleanup.

Responsible Party: Director of Public Works
In Coordination With: Department of Public Works
When: Short-term and ongoing
Resources Available: Town annual budget
Model: RIEMA and FEMA Debris Management Plans
Benefit: Decrease flooding potential, maintain public safety, decrease damage to critical infrastructure
Estimated Cost: Minimal to no additional costs

Risk Area # 2 – Goal: Prevent power failure and loss of communication systems due to fallen tree limbs during weather events.

Action 5 – Regular Tree Trimming – High priority.

- a) Establish a tree trimming program to trim trees adjacent to utility lines to avoid power outages and loss of communication systems during and after hurricanes, thunderstorms, ice storms and windstorms.

Responsible Party: Director of Public Works
In Coordination With: Department of Public Works, Narragansett Electric
When: Short-term
Resources Available: Town annual budget, Narragansett Electric
Model: City of Pawtucket, City of Warwick
Benefit: Decrease damage to critical infrastructure, public safety, reduce clean-up costs
Estimated Costs: Unknown

Risk Area # 3 – Goal: Protect the community from the effects of a forest fire.

Action 6 – Develop a Master Fire Plan – High Priority.

- a) A master fire plan is a comprehensive review addressing a community's ability to maintain a high level of fire protection, prepare for large-scale

disasters and training personnel. A Master Fire Plan for West Greenwich is intended to result in specific recommendations to amend land use regulation, review current and future fire suppression resources, increase response times, reduce risks from fires and increase the education and training of personnel and the citizenry.

Responsible Party: Fire Chief

In Coordination With: Fire Departments and Professional Consultant

When: Short-term

Resources Available: FEMA

Model: Fire Master Plan, City of Boulder

Benefit: Increase Public Safety

Estimated Cost: \$30,000 - \$40,000

Action 7 – Create Firebreaks, Fire Lanes and Install Cisterns/Dry Hydrants – High priority.

- a) In order to prevent the spread of forest fires, evaluate and construct firebreaks, fire lanes and install cisterns/dry hydrants as necessary.

Responsible Party: Fire Chief

In Coordination With: Outside vendor supervised by Fire Department

When: Long-term

Resources Available: FEMA, RIEMA, State and Local funds

Model: Approved Fire Standards

Benefit: Increased response time, increase public safety

Estimated Cost: To be determined

Action 8 – Ensure Access Points to Large Forested Areas – High priority.

- a) In the event of forest fires, access to the fire is essential in order to protect property and lives. To increase access and response time for emergency vehicles, it is imperative to coordinate efforts with the RI DEM to ensure access to large forested state owned property as well.

Responsible Party: Fire Chief

In Coordination With: Fire Department and Town Council

When: Short-term

Resources Available: State and Local funds

Benefit: Increased response time, increase public safety

Estimated Costs: Unknown

Risk Area # 4 – Goal: Ensure the community is effectively prepared for and can respond to the effects of the natural hazards faced by the community.

Action 9 – Direct, Develop and Implement Public Education and Outreach Programs for Preparedness and Emergency Response – High priority.

- a) Distribute and make material available concerning evacuation routes and emergency shelters as well as how residents can prepare for each natural hazard that affects West Greenwich.

Responsible Party: Emergency Management Department

In Coordination With: Police Department and Fire Department

When: Short-term

Resources Available: West Greenwich Hazard Mitigation Committee, American Red Cross, RIEMA and FEMA

Benefit: Increased public safety; protection of life

Estimated Costs: \$10,000

- b) Organize and conduct training programs for town officials, employees, boards and commissions regarding hazard mitigation; including flood mitigation and actions/responsibilities during a natural disaster.

Responsible Party: Emergency Management Director

In Coordination With: Hazard Mitigation Committee

When: Medium-term

Resources Available: Town annual budget

Benefit: Improved coordination during an event; continued support for future mitigation actions

Estimated Costs: \$5,000

Section 4.2 Strategy Adoption

The West Greenwich Strategy for Reducing Risks from Natural Hazards was approved for adoption by the West Greenwich Hazard Mitigation Committee and then forwarded to the Town Council for adoption via resolution on November 10, 2004.

Section 4.3 Implementation, Evaluation and Revision

The Town of West Greenwich and the Hazard Mitigation Committee realize that successful hazard mitigation is an ongoing process that requires implementation, evaluation and updated revisions to this Plan. Also realized is the importance of integrating the vulnerable areas and recommendations into the Town's Comprehensive Plan, Emergency Plan and site plan review process. It is intended that this Plan and the ongoing efforts of the Hazard Mitigation Committee will preserve and enhance the quality of life, property and resources for the Town of West Greenwich.

Implementation

Implementing the recommended actions within the assigned time frames shall require the Hazard Mitigation Committee to meet bi-annually. Actions will be implemented based on those that will benefit the community the greatest as agreed upon by the Committee,

during general discussions, using the benefits listed under each action. The Committee assigned a High, Medium and Low priority, as listed next to each action, which designates the order in which actions are to be implemented. Any action that needs to be funded by outside resources will be implemented once funding is secured. To establish accountability and authority for the implementation of actions, the Emergency Management Director will coordinate and document the progress of each action utilizing the Mitigation Action Progress Form (see Appendix D). Furthermore, the Committee will recommend that this Plan become an Annex to the present Comprehensive Plan and any revisions thereof.

Evaluation

The agenda for the bi-annual Hazard Mitigation Committee meeting will include a review of the prioritized recommended actions, documentation of progress and obstacles encountered and an inventory of resources secured and needed to carry out remaining actions. The Committee will also evaluate and propose changes to this Plan, especially following a natural disaster, in order to address its effectiveness, modification of recommended actions and changes to vulnerable areas. A status report will be submitted to the Town Council following the bi-annual meetings. Finally, each meeting of the Committee will be properly advertised as a Public Meeting to encourage the participation of members of the community and include their input regarding actions being taken and future revisions.

Revision

The “Strategy for Reducing Risks from Natural Hazards in West Greenwich, Rhode Island” shall be updated on a five (5) year basis, or after a disaster, by the West Greenwich Hazard Mitigation Committee. Each updated version will be submitted to the RIEMA to ensure consistency with statewide goals and objectives.

REFERENCES

Christopher Tuttle, Consultant – Fire Suppression Rhode Island Emergency Management Agency.

David R. Vallee, 1997. Rhode Island Hurricanes and Tropical Storms: A Fifty-six Year Summary 1936 to 1991. National Weather Service Office. Providence, Rhode Island.

Earthquake: Needs Assessment. Rhode Island Emergency Management Agency. October 1994.

Flood Hazard Mitigation Planning: A Community Guide. Massachusetts Department of Environmental Management Flood Hazard Management Program. June 1997.

Flood Insurance Rate Maps for the Town of Cumberland, Rhode Island, Providence County. Federal Emergency Management Agency. 1992.

National Climatic Data Center. National Oceanic and Atmospheric Administration. National Climatic Data Website – www.ncdc.noaa.gov .

State and Local Mitigation Planning How-To Guides. FEMA. FEMA 386-2, August 2001. FEMA 386-3, April 2003. FEMA 386-4, April 2003.

The City of Boulder Master Fire Plan. Accessed through www.ci.boulder.co.us/fire

Town of West Greenwich Comprehensive Plan, 2004.

Town of West Greenwich Emergency Operations Plan, 2004.

APPENDIX A – Technical and Financial Assistance for Mitigation

State Resources

Coastal Resources Center

University of Rhode Island
Narragansett Bay Campus
Narragansett, RI 02882
(401) 874-6224

Coastal Resources Management Council

Steadman Government Center
4808 Tower Hill Road
Wakefield, RI 02879
(401) 222-2476

Department of Administration

Division Of Planning
One Capitol Hill
Providence, RI 02908
(401) 222-6478

Department of Environmental Management

Division of Parks and Recreation
2321 Hartford Avenue
Johnston, RI 02919
(401) 222-2635

Department of Transportation-Design Section/Bridges

2 Capitol Hill, Room 231D
Providence, RI 02903
(401) 222-2053

Rhode Island Banking Commission/ Associate Director

233 Richmond Street
Providence, RI 02903
(401) 222-2405

Rhode Island Builders Association

The Terry Lane Corporation
Terry Lane
Glocester, RI 02814
(401) 568-8006

Rhode Island Department of Business Regulations

233 Richmond Street
Providence, RI 02903
(401) 222-2246

Rhode Island Emergency Management Agency

645 New London Avenue
Cranston, RI 02920
(401) 946-9996

Public Utilities Commission

100 Orange Street
Providence, RI 02903
(401) 222-3500 ext. 153

State Fire Marshal's Office

272 West Exchange Street
Providence, RI 02903
(401) 222-2335

State of Rhode Island Building Committee Office

Building Commissioner's Office
One Capitol Hill
Providence, RI 02903
(401) 222-3529

Federal Resources

Economic Development Administration

143 North Main Street, Suite 209
Concord, NH 03301
(603) 225-1624

Federal Emergency Management Agency

Mitigation Division
Region I Office
J.W. McCormack POCH, Room 462
Boston, MA 02109
(617) 223-9561

Small Business Administration

360 Rainbow Blvd., South, 3rd Floor
Niagara Falls, NY 14303
(716) 282-4612 or (800) 659-2955

U.S. Army Corps of Engineers

New England District
424 Trapelo Road
Waltham, MA 02254
(617) 647-8505

U.S. Department of Agriculture

Natural Resources Conservation Service
(formerly Soil Conservation Service)
451 West Street
Amherst, MA 01002
(413) 253-4362

U.S. Fish and Wildlife Service

New England Field Office
22 Bridge Street, Unit #1
Concord, NH 03301-4986

U.S. Department of Commerce

National Weather Service

Forecast Office
445 Myles Standish Boulevard
Taunton, MA 02780
(508) 823-2262

U.S. Department of Housing and Urban Development

Comm. Development Block Grants
Region I-O'Neill Federal Building
10 Causeway Street
Boston, MA 02222
(617) 656-5354

U.S. Department of the Interior

National Park Service

River & Trail Conservation Program
Regional Office
15 State Street
Boston, MA 02109
(617) 223-5203

U.S. Environmental Protection

Agency – Region I

JFK Federal Building
Government Center
Boston, MA 02203
(617) 565-3400

U.S. Geological Society

12201 Sunrise Valley Drive
Reston, VA

Other Resources

The Association of State Floodplain Managers (ASFPM)

Professional association with a membership of almost 1,000 state employees that assists communities with the NFIP. ASFPM has developed a series of technical and topical research papers and a series of proceedings from their annual conferences. Many mitigation “success stories” have been documented through these resources and provide a good starting point for planning.

Floodplain Management Resources Center

Free library and referral service of the ASFPM for floodplain management publication. Co-located with the Natural Hazards Center at the University of Colorado in Boulder, staff can use keywords to identify useful publications from the more than 900 flood-related documents in the library.

Institute for Business and Home Safety (IBHS) (formerly Insurance Institute for Property Loss Reduction)

An insurance industry sponsored, nonprofit organization dedicated to reducing losses – deaths, injuries and property damage – resulting from natural hazards. IBHS efforts are directed at five specific hazards: flood, windstorm, hail, earthquake and wildfire. Through its public education efforts and information center, IBHS communicates the results of its research and statistical gathering, as well as mitigation information, to a broad audience.

Volunteer Organizations

Organization, such as the American Red Cross, the Salvation Army, Habitat for Humanity, Interfaith and the Mennonite Disaster Service are often available to help after disasters. Service organization, such as the Lions, Elks and VFW are also available. These organizations have helped others with food, shelter, clothing, money, etc. Habitat for Humanity and the Mennonite Disaster Service provide skilled labor to help rebuild damaged buildings incorporating mitigation or flood proofing concepts. The offices of individual organizations can be contacted directly or the FEMA Regional office may be able to assist.

Flood Relief Funds

After a disaster, local businesses, residents and out-of-town groups often donate money to local relief funds. They may be managed by the local government, one or more local churches or an ad hoc committee. No government disaster declaration is needed. Local officials should recommend that the funds be held until an applicant exhausts all sources of public disaster assistance. Doing so allows the funds to be used for mitigation and other projects that cannot be funded elsewhere.

New England States Emergency Consortium (NESEC) – Lakeside Office Park

NESEC conducts public awareness and education programs on natural disaster and emergency management activities throughout New England. Brochures and videotapes are available on such topics as earthquake preparedness, mitigation and hurricane safety tips. NESEC maintains a world wide web home page that is accessible at

<http://www.serve.com/NESEC>.

The New England Floodplain and Stormwater Managers Association (NEFSMA)

Professional organization for New England floodplain and stormwater managers. Provides workshops, conferences and a newsletter to membership and interested individuals and companies. NEFSMA home page is accessible at

<http://www.seacoast.com/~nefsma>.

APPENDIX B – Existing Protection Systems – State and Federal

State

Earthquakes and Hurricanes:

A certain amount of funding is allotted to each state per year based on a risk formula for earthquakes. Coastal states are allocated funds based on a risk formula for hurricanes. Each state receiving such funds has the ability to grant project funds to a community. There is not a match requirement on the part of the community, but the funds are limited and are generally only available once a year. The projects or products proposed for such funding must demonstrate that earthquake or hurricane risk will be reduced or eliminated and that the proposed projects or product is a cost-effective measure (a stringent cost/benefit analysis need not be performed). Information about the amount of funding available per year and the state requirements for eligibility and performance may be obtained from the RIEMA at (401) 946-9996.

Economic/Community Development

There may be programs existing to help flood proof homes using Community Development Block Grant funds. There may be housing assistance programs in the community that can be used following a major flood, achieving both the objectives of reducing flood damage and improving the community's housing stock (see Appendix A, "Federal Resources", for more information).

Evacuation Plans and Systems

The community's emergency operations center should have evacuation plans in place. For communities near a nuclear power plant, evacuation plans are required and may also be used for flood evacuation. The RIEMA may have additional evacuation plan information.

Land Use Restrictions

There are several federal and state regulations that serve to restrict land use in certain areas that may help reduce flood hazard vulnerability. If the community has open land owned by the state or federal government, examine what restrictions are placed on its development. In addition, the state Wetlands Protection Act regulates the development of all lands identified as significant to the protection of resources identified in the act.

Septic Systems

If there are areas in the community not served by a public sewer system, state septic system regulation influence development and may be a consideration for mitigation alternatives that include rebuilding and elevation of structures. Specific design requirements must be met for any construction in coastal velocity zones or river floodways. Generally, an inspection of a septic system is required if there is a change in use of the structure, an increase in flow or failed system. Limited inspections are required if the footprint of the structure is being changed. Upgrades are required by the state if an inspection reveals a failed system. However, local regulations may be more restrictive than state requirements, requiring inspections or upgrades in other cases.

Warning Systems and Emergency Operations Plans:

The community may have a flood warning system in place and should have a plan for response to flooding.

Federal**Community Rating System (CRS)**

A voluntary initiative of the NFIP, the CRS was developed to encourage communities to perform activities that exceed the minimum NFIP floodplain management standards. If a community participating in the CRS performs activities that include maintaining records for floodplain development, publicizing the flood hazard, improving flood data and conducting floodplain management planning, then the flood insurance premiums paid by policy holders in the community will be reduced by 5 to 45 percent. Developing a flood mitigation plan will help communities gain additional credit under the CRS.

Hazard Mitigation Grant Program

Also known as the 404 Program or HMGP, this program is available only after a federally declared disaster occurs. It represents an additional 15 percent of all the infrastructure and individual assistance funds that are provided to states to repair damages and recover from losses and is administered by the state in partnership with FEMA. Having a plan or completed mitigation action matrix prior to a disaster event is required by FEMA and is extremely helpful in meeting the states' deadlines for applications and ensuring the project is eligible and technically feasible. It provides 75/25 matching grants on a competitive basis to state, local and tribal governments, as well as to certain nonprofit organizations that can be matched by either cash or in-kind services. The grants are specifically directed toward reducing future hazard losses and can be used for projects protecting property and resources against the damaging effects of floods, earthquakes, wind and other hazards. Specific activities encouraged under the HMGP include acquiring damaged structures to turn the land over to the community for open space or recreational use, relocating damaged or damage-prone structures out of the hazard area and retrofitting properties to resist the damaging effects of disasters. Retrofitting can include wet- or dry-flood proofing, elevation of the structure above flood level, elevation of utilities or proper anchoring of the structure.

Two programs that have been authorized under the National Flood Insurance Reform Act of 1994 include the Flood Mitigation Assistance (FMA) program and a provision for increased cost of compliance (ICC) coverage. FMA makes grants available on a pre-disaster basis for flood mitigation planning and activities, including acquisition, relocation and retrofitting of structures. FMA grants for mitigation projects will be available only to those communities with approved hazard mitigation plans. ICC coverage has recently been implemented for all new NFIP policies and renewals and is intended to be "mitigation insurance" to allow homeowners whose structures have been repeatedly or substantially damaged to cover the cost of elevation and design requirements for rebuilding with their flood insurance claim up to a maximum of \$15,000. A certain amount of funding is allotted to each state per year based on a risk formula for floods. Each state has the discretion to award funds to communities or to

state government agencies. States may use whatever criteria or method they choose to award the funds as long as the applicant and the proposal are eligible. The program may fund up to 75 percent of the total cost of the proposed project, with a minimum of 25 percent of the cost coming from the community. A minimum of half the community share must be cash or “hard match”. Funds can also be granted to communities to help them prepare local flood mitigation plans. The same match requirements apply. Once a community receives a planning grant, however, it is not eligible to receive additional planning grants for another five years. For further information on the FMA program or ICC coverage, contact the RIEMA at (401) 946-9996.

National Flood Insurance Program (NFIP)

All of Rhode Island’s 39 municipalities participate in the NFIP. This program is a direct agreement between the federal government and the local community that flood insurance will be made available to residents in exchange for community compliance with minimum floodplain management regulations. Communities participating in the NFIP must:

- Adopt the flood insurance rate maps as an overlay regulatory district

- Require that all new construction or substantial improvement to existing structures in the flood hazard area be elevated or (if nonresidential) flood proofed to the identified flood level on the maps

- Require design techniques to minimize flood damage for structures being built in high hazard areas, such as floodways or velocity zones

In return for community adoption of these standards, any structure in that community is eligible for protection by flood insurance, which covers property owners from losses due to inundation from surface water of any source. Coverage for land subsidence, sewer backup and water seepage is also available subject to the conditions outlined in the NFIP standard policy (see Appendix A, “Federal Resources”, for contacts regarding insurance coverage and purchase). Since homeowners insurance does not cover flooding, a community’s participation in the NFIP is vital to protecting property in the floodplain as well as being essential to ensure that federally backed mortgages and loans can be used to finance flood prone property.

APPENDIX C – Resolution and Miscellaneous Information

WEST GREENWICH
POLICE DEPARTMENT
TEL(401) 397-7191
FAX (401) 397-6990



260 VICTORY HIGHWAY
WEST GREENWICH
RHODE ISLAND 02817

Town of West Greenwich
INCORPORATED 1741

GARY F. MALIKOWSKI, CHIEF OF POLICE

Resolution: Approving the Town of West Greenwich Natural Hazard Mitigation Plan “
Reducing risks from natural hazards in West Greenwich, Rhode Island”

Be it Resolved by the Town Council of West Greenwich as Follows:

Whereas: the Town of West Greenwich is required to create a local Natural Hazards Mitigation Plan in West Greenwich, Rhode Island; and the Town Council created and approved an committee to formulate the plan; and the committee composed a Natural Hazard Mitigation Plan, and forwarded it to the Town Council for their review and consideration; and the Town Council is desirous of complying with the requirements to create a Natural Hazard Mitigation Plan; and the Town Council believes it would be desirable and advantageous to accept this Hazard Mitigation Plan as the official plan for the Town of West Greenwich.

Therefore, be it resolved by the Town Council of West Greenwich, Rhode Island, as follows:

The Town council hereby acknowledges and accepts this plan, submitted and directs all employees and department heads to undertake the necessary actions to

implement the plan. That this resolution shall become effective immediately upon
passage by the West Greenwich Town Council.

Attest: Thaylen H. Waltonen 8/3/05
Town Council President Date

**TOWN OF WEST GREENWICH
RHODE ISLAND
NOTICE OF PUBLIC HEARING**

Notice is hereby given that a public meeting will be held on Tuesday, August 10, 2004 at 7:30 PM in the West Greenwich Town Council Chambers at 280 Victory Highway to consider the Natural Hazard Mitigation Plan for the Town of West Greenwich.

AGENDA

Call to Order

Business:

To review the Hazard Mitigation Plan as being written for the Town of West Greenwich.

Adjournment

No citizens attended.

Cc: Committee Members
EMA Director Michael E Pfeiler
Town Administrator Kevin A Breene
Police Chief Gary F Malikowski
Fire Chief David P Andrews – Public Works
Town Planner Jennifer Paquette

**TOWN OF WEST GREENWICH
RHODE ISLAND
NOTICE OF PUBLIC HEARING**

Notice is hereby given that a public meeting will be held on Wednesday November 3, 2004 at 7:30 PM in the West Greenwich Town Council Chambers at 280 Victory Highway for the final review of the Natural Hazard Mitigation Plan for the Town of West Greenwich.

AGENDA

Call to Order

Business:

The final review of the Hazard Mitigation Plan as being written for the Town of West Greenwich.

Adjournment

No citizens attended.

Cc: Committee Members
EMA Director Michael E Pfeiler
Town Administrator Kevin A Breene
Police Chief Gary F Malikowski
Fire Chief David P Andrews – Public Works
Town Planner Jennifer Paquette

APPENDIX D – Mitigation Action Progress Form

Mitigation Action Progress Form

[illegible]