

Strategy for Reducing Risks
from Natural Hazards in
Pawtucket, Rhode Island:
A Multi-Hazard Mitigation Strategy



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Section 1.0 – Goals and Objectives

Natural hazard mitigation is an action taken to permanently reduce or eliminate long-term risk to people and their property from the effects of natural hazards (e.g., wind, fire, flood, nor'easter, hurricane, earthquake, etc.).

1.1 What Mitigation Can Do for Pawtucket

An important benefit of hazard mitigation is that money spent today on preventative measures can significantly reduce the cost of post-disaster cleanup tomorrow. By planning ahead, Pawtucket will minimize the economic and social disruption that can result from floods, blizzards, or hurricanes (destruction of property, loss or interruption of jobs, and the loss of businesses).

Municipal officials in Pawtucket assessed the risks to the city and developed mitigation actions that address a mix of structural initiatives to minimize the effects of future hazards (e.g., building code enforcement, retrofitting existing structures, and removal of vulnerable structures) and nonstructural initiatives (e.g., educational programs, preventing construction in high-hazard areas, enforcing regulations). By creating this strategy, Pawtucket has established an ongoing process that will make hazard mitigation a routine part of municipal government.

Formal adoption and implementation of this hazard mitigation strategy will help Pawtucket gain credit points under the Federal Emergency Management Agency's (FEMA) Community Rating System (CRS) program, which provides discounts on National Flood Insurance Program (NFIP) flood insurance premiums for residents of communities that voluntarily participate in this program. In addition, the adoption of this mitigation strategy increases Pawtucket's eligibility for federal grants for hazard mitigation which include FEMA's pre-disaster Flood Mitigation Assistance (FMA) program and FEMA's post-disaster Hazard Mitigation Grant Program (HMGP). (Refer to Appendix B for further information.)

1.2 Pawtucket's Mission Statement

Preserve and enhance the quality of life, property, and resources by identifying areas at risk from natural hazards and implementing priority hazard mitigation actions in order to protect the Blackstone Valley's infrastructure, population, and historical, cultural, and natural resources.

1.3 Hazards Assessment

The city of Pawtucket identified risks, assessed the degree of vulnerability of those areas "at risk" (e.g., structures, population, and natural resources), and examined possible impacts from natural disasters (e.g., loss of life, environmental damage, inconvenience to residents). Risk describes the characteristics of the hazard and can be defined in terms of magnitude, duration, distribution, area affected, frequency, probability. Vulnerability indicates what is likely to be damaged by the identified hazards and how severe that damage could be. With help from the University of Rhode Island (URI) Environmental Data Center, Pawtucket mapped high risk areas in the city (see maps on page 3 and page 5). These maps indicate the flood zones, repetitive loss areas, areas of historic flooding (not marked on the FEMA Flood Insurance Rate Map), evacuation routes, dams, bridges, and American Red Cross-approved shelters.

Pawtucket is a flood-prone community in which significant cultural, historical, and economic resources are at risk (see Table 1). There are also a few high-hazard dams in the city and upstream from the city that pose a risk to Pawtucket. The Blackstone River cuts through the middle of Pawtucket and flows into Narragansett Bay. The Blackstone River contains both "A-" and "V"-flood zones. An A-zone is an area that would be inundated by a 100-year flood but is not subject to velocity wave impact. A V-zone is a velocity zone that is subject to breaking wave action.

Table 1. Summary of National Flood Insurance Program Activity in Pawtucket

Total Policies	Value of Property Covered	Policies in V-Zone*	Policies in A-Zone*	Claims Since 1978
96	\$7,430,300	0	7	20

* V-zone refers to the velocity zone, where waves greater than 2.9 feet are feasible during a 100-year flood. A-zone refers to other areas within the 100-year flood zone with less than 2.9-foot waves (FEMA, 1997).



Hurricanes can result in flooding and high winds causing damage to residential homes (especially mobile homes), businesses, historical buildings, dams, and bridges. Most of Pawtucket is at risk to fire hazard; because of the close urban setting, a fire could spread quickly.

- Population at Risk

There are five emergency shelters throughout the city. Baldwin Elementary School, McCabe Elementary School, Varieur Elementary School, and Jenks Junior High School all have an agreement with the American Red Cross to operate as a mass care facility. The Comfort Inn can also serve as a shelter, but does not have Red Cross certification. None of the shelters are at risk to flood. Total shelter capacity is 1,750, which is sufficient for the city population. In case of an emergency, additional shelters could be established.

- Property at Risk from Flood and Wind Events

The 100-year flood (also referred to as a base flood) is an event that has a 1 percent chance of happening in any given year and is the storm event used to determine the flood zones, which have specific zoning and building requirements throughout the city and state. Since the 1970s, flood ordinances regulated development in floodplains and prohibited structures in the floodplain unless the lowest floor was located above the 100-year base flood elevation.

Pawtucket has suffered property damage from the last few hurricanes due to flooded sewer lines. A significant portion of the city east of the Blackstone River experiences frequent street and basement flooding during heavy rain. This is due to a combination of factors, including the inability of the current combined sewer overflow (CSO) system to handle the runoff during heavy rainfall. The pipes in the CSO system have become clogged with scum buildup over the years, decreasing the capacity of the lines. To help correct this problem, some backflow-prevention valves have been installed where the sanitary line that runs from the house connects to the CSO system.

- Property at Risk from Earthquakes

According to the R.I. Emergency Management Agency (RIEMA), experts believe that earthquakes are likely to strike the eastern half of the country within the next 50 years. The U.S. Geological Survey (USGS) estimates that there is a 40 to 60 percent chance of experiencing an earthquake of magnitude 6.0 or greater on the Richter Scale (1 to 10) in the central or eastern United States within the next 30 years. Buildings that are most at risk from earthquakes are the old masonry buildings and large structures, such as McCoy Stadium.

- Potential Losses to the Local Economy

As seen in Table 1, FEMA estimated that the value of property insured by the NFIP in Pawtucket is over \$7 million.

- Risk Matrix

As a result of the Blackstone Valley public regional workshop in 1997, the city of Pawtucket and other local officials developed a risk assessment matrix which is presented in Table 2. The first component of the risk assessment focused on existing risk and the second component evaluated potential risk.

- Capability Assessment

"This capability assessment is the critical link between the process of evaluating hazards and developing mitigation strategies."

—Tennessee Emergency Management Agency

The city implements and enforces the state building code and participates in NFIP, as do all the communities in Rhode Island. The city's emergency operations plan recommends pre- and post-disaster strategies and measures to reduce loss of life and destruction of property. A variety of hazard mitigation strategies were developed following a federal disaster declaration for Hurricane Gloria in 1986.

The city revised its emergency operations plan in 1997. The plan addresses the response to extraordinary emergency situations associated with natural disasters. RIEMA is actively working with Pawtucket to incorporate an Annex K - Municipal Administration Plan for Hazard Mitigation into their existing emergency operations plan.

Risks in Pawtucket

Map 1

Dams

- 1 10 Mile River Dam/Golf Club Dam
- 2 Main Street Dam
- 3 Pantex Dam
- 4 Slater Mill Dam

Bridges

Trailer Parks

City Hall

Electrical Power Plant

Electrical Sub Station

Historic Slater Mill

McCoy Stadium

Wrecking Yard

NBC Treatment Plant

Schools

1 Dot = 30 Housing Units
(Housing Density Not Actual Locations)

Flood Zones

- V - Zone (100 Year)
- A - Zone (100 Year)
- X - 500 Year

Highlighted Flood Areas

- Flood areas with repetitive loss structures
- Storm related sewer backups

Land Use

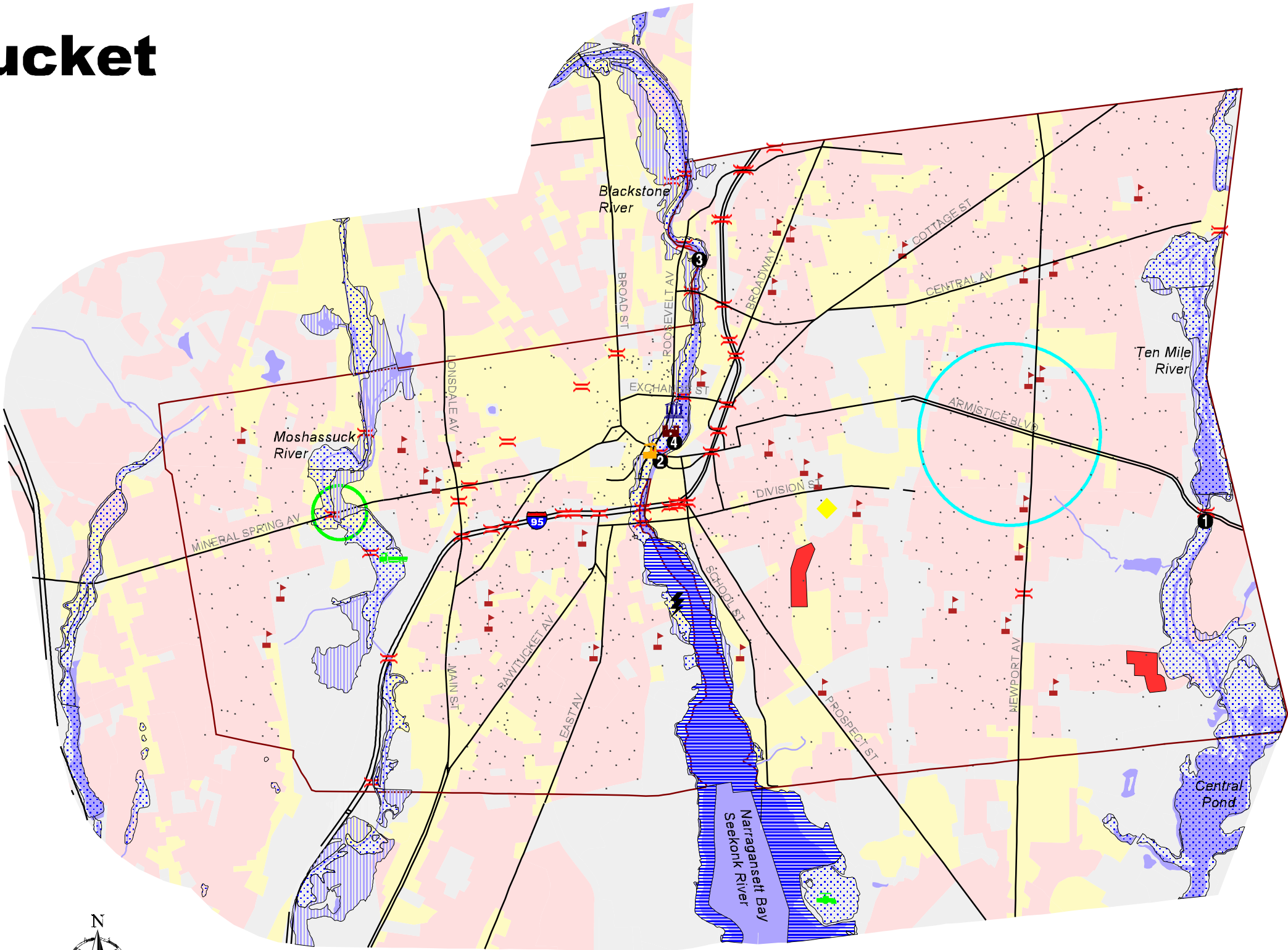
- Water
- Commercial and Industrial
- Residential
- Other

Rivers and Streams

Primary and Secondary Roads

Town Boundary

Note: Information has been extended 1 Kilometer around the Pawtucket border. This extension is intended to aid administrators in hazard mitigation. Data for Massachusetts are not available.



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Critical Facilities In Pawtucket

Map 2

Red Cross Approved Shelters

- 1 Curvin-McCabe
- 2 Elizabeth Baldwin
- 3 Francis J. Varieur
- 4 Joseph Jenks Jr. High

- Hospitals
- Emergency Room
- Fire Departments
- Police Stations or Substations

- Evacuation Routes
- Traffic Control Points

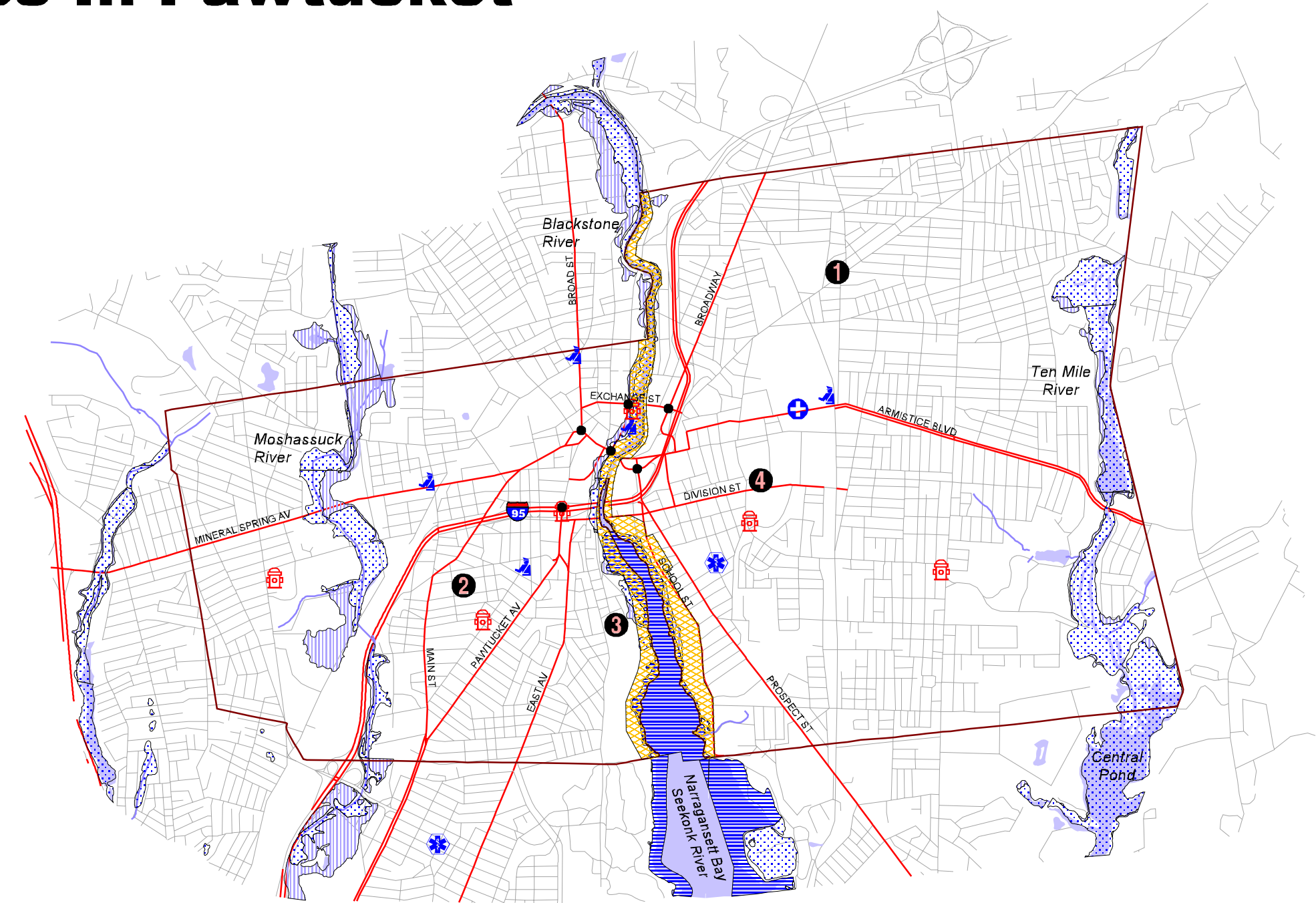
- Flood Zones**
- V - Zone (100 Year)
 - A - Zone (100 Year)
 - X - 500 Year

- SLOSH Evacuation Areas
- Rivers and Streams

- Water
- Minor Roads

- Town Boundary

Note: Information has been extended 1 Kilometer around the Pawtucket Border. This extension is intended to aid administrators in hazard mitigation. Data for Massachusetts are not available.



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TABLE 2. RISK ASSESSMENT MATRIX

RISKS/TYPES OF PROJECTS	LOCATION (PLAT #)	OWNERSHIP	NATURAL HAZARD	PRIMARY PROBLEM/EFFECT	MITIGATION BENEFITS	RISK (Historical - H or Potential - P)
BVE Electrical Utilities Substation	(Plat #65B)	private	ice damage, earthquake, flood	loss of electricity/ economic damage	economic stability, provision of essential services to public	P
City Hall	(Plat #43A)	public	ice damage, severe flood earthquake	structural damage, water damage/ computer operation, record storage	protection of essential public services	H and P
Filtration Plant	Cumberland, R.I.	public	ice damage, earthquake	health hazard, economic disruption, disruption to essential services	protection of public, safeguard against expensive repairs	P
High-Rise Structures	1. Kennedy (Plat #43B) 2. Fogarty (Plat #43B) 3. Towers East (Plat #53B) 4. Slater Apartments (Plat #53B) 5. Centennial Towers (Plat #44B)	public and private	wind, hurricane, nor'easter, earthquake, ice damage	loss of life, property damage	protection of life, property	P
Historic Buildings, National Register	various (+270)	two-thirds private	flood earthquake, ice damage	economic damage, structural damage	historical and cultural preservation, economic stability	P
I-95 Bridges	1. East Street (Plat #6A) 2. Pawtucket River (Plat #23B)	public	earthquake, ice damage	loss of access, disruption of evacuation routes, loss of life, economic disruption	protection of life, secured evacuation routes	P
Industries in the Floodplain	(Plat #41, #53)	private	flood	disruption to industries, loss of businesses	private property protection, economic stability	H and P
Local Bridges	1. Walcott Street (Plat #23B) 2. Broadway/Route 1 (Plat #20A) 3. Central Avenue (Plat #20A) 4. Main Street (Plat #43A) 5. Division Street (Plat #54B)	public	1. earthquake 2. wind 3. flood 4. flood waters rise to base of bridge, earthquake 5. earthquake, ice damage	loss of life and/or access, disruption of evacuation routes, economic disruption	protection of life, secured evacuation routes	P
McCoy Stadium	(Plat #26B)	public	ice damage, earthquake	structural damage, risk to public safety	economic stability	P
Mobile Homes	various (+250)	private	flood, ice damage, earthquake, wind	destruction, economic loss, loss of homes	protection of life, property	P
Narragansett Bay Commission Treatment Plant	East Providence, R.I.	public	ice damage, earthquake, flood	structural damage	prevention of pollution and health hazards	H and P
River Dams	citywide	private	flood, structural damage, ice damage, earthquake	loss of life, property damage	protection of life, property	P

TABLE 2. RISK ASSESSMENT MATRIX (Continued)

RISKS/TYPES OF PROJECTS	LOCATION (PLAT #)	OWNERSHIP	NATURAL HAZARD	PRIMARY PROBLEM/EFFECT	MITIGATION BENEFITS	RISK (Historical - H or Potential - P)
Schools	1. Varieur Elementary (Plat #65B) 2. Baldwin Elementary (Plat #55A) 3. Cunningham Elementary (Plat #46A) 4. Greene Elementary (Plat #58A) 5. Winter Elementary (Plat #8A/20B) 6. Curvin-McCabe Elementary (Plat #9A) 7. Potter Elementary (Plat #16A) 8. Fallon Elementary (Plat #33A) 9. Curtis Elementary (Plat #2A) 10. Little Elementary (Plat #25A) 11. Goff Junior High (Plat #18B) 12. Slater Junior High (Plat #46A) 13. Jenks Junior High (Plat #26A) 14. Shea High (Plat #65A) 15. Tolman High (Plat #22B)	public	ice damage, earthquake	public safety, economic hardship, loss of shelters	loss of municipal operation, protection of life, property, and shelters	P
	16. St. Raphael Academy (Plat #24B) 17. St. Leo's (Plat #11B) 18. St. Teresa's (Plat #18B) 19. Woodlawn (Plat #46A) 20. Bishop Keough (Plat #60B)	private	ice damage, earthquake	public safety, economic hardship, loss of shelters	loss of municipal operation, protection of life, property, and shelters	P
Slater Mill	(Plat #43A)	private	flood	structural damage, economic loss	historical and cultural preservation, economic stability	P
Wrecking Yard	(Plat #57B)	private	ice damage, flood, fire	hazardous waste contamination into Mosshassuck River, cleanup costs	prevention of contamination to residential areas	P



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This matrix was developed by the City of Pawtucket, the University of Rhode Island Coastal Resources Center, and Rhode Island Sea Grant in collaboration with the Rhode Island Emergency Management Agency.



Pawtucket has initiated many studies and activities over the years that have laid the foundation for the development of this mitigation strategy. In 1965, the city developed its first comprehensive plan, which was updated in 1995. This plan outlines actions that can be taken to address increased development pressures, economic stability, open space and recreation issues, and public infrastructure and facilities. The comprehensive plan outlines goals, policies, issues, and actions to provide a framework for everyday operations within the city. The city recognized that incorporating mitigation initiatives (both pre-disaster and post-disaster) into the comprehensive plan would not only benefit the community by reducing human suffering, damages, and the costs of recovery, but would also help build and maintain the sustainability and economic health of the city over the long run.

Section 2.0 – Mitigation Actions

The Local Hazard Mitigation Committee (LHMC) consists of the city emergency management director, the city principal planner, the project engineer for the Department of Planning and Redevelopment, public works director, and the fire chief. 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. The State Hazard Mitigation Committee (SHMC) has reviewed and approved these goals and objectives to ensure consistency with the statewide goals and objectives. The time frames used for this strategy are as follows:

Short Term = 0 to 6 Months

Medium Term = 6 to 18 Months

Long Term = 18 Months to 5 Years

2.1 Mitigation Activities

- Mitigation Matrix

The mitigation matrix on page 11 uses the risk assessment matrix to summarize areas at risk and to specify mitigation actions. This matrix also assigns responsible parties to the area at risk. It offers possible finance options and reflects town priorities. For all recommended actions, the lead department or agency responsible for that action is listed first and is followed by other relevant departments/agencies.

- Amend Comprehensive Plan Policies

The LHMC incorporated the theme of hazard mitigation into each of the seven elements in the comprehensive plan. These proposed amendments recognize the impact of natural hazard events and provide guidance on what can be done to protect life, property, natural resources, and the economic health of the city.

The proposed amendments are in *italics* for the following comprehensive plan elements:

1) LAND USE

- Consider possible rezoning of industrial lands that are no longer used or viable for industrial purposes. Consider conservation of open space via acquisition of repetitive loss structures after careful review of overlays.
- Protect existing publicly owned open space and recreational areas through existing floodplain regulations and proper zoning ordinances.
- Protect existing industrial zones and preserve viable vacant industrial sites for industrial uses. Floodproofing measures should be encouraged for sites in the floodplain.

2) HOUSING

- Ensure a balance among residential growth, the conservation of environmental resources, and preservation of recreational and cultural resources through a detailed analysis of the risks and vulnerability of natural hazards.

3) ECONOMIC DEVELOPMENT

- Provide sites suitable for various commercial and industrial activities in relation to projected needs within Pawtucket's land use planning program. Provide sites that are as free as possible from risk to natural hazards for commercial and industrial activities.



- Provide the proper capacity and type of utilities to appropriate locations for economic development activities after a careful assessment of natural hazard risk.

4) NATURAL AND CULTURAL RESOURCES

- Incorporate mitigation measures, such as retrofitting buildings, to preserve and use, or adaptively reuse structures or sites on the National Register of Historic Places, or in the Local Historical District. For example, elevate or floodproof, install individual fire alarm systems in urban areas where historic buildings are close in proximity.
- Improve the multi-family neighborhoods where most of the residential structures are over 70 years old by bringing these structures up to current floodplain standards.

5) OPEN SPACE AND RECREATION

- Maintain and improve city recreational and open space resources and programs. Investigate the use of flood-prone areas as open space.

6) COMMUNITY SERVICES AND FACILITIES

- Promote and improve, where necessary, the services and facilities that are vital to the health, safety and welfare of Pawtucket's citizens, neighborhoods, and its business and industry. The city should consider retrofitting critical facilities, if necessary. For example, City Hall is located at the lowest elevation in Pawtucket and is prone to basement flooding.

7) TRANSPORTATION

- Provide for public participation in the planning and design of the local and regional transportation system and its functional components which should include emergency evacuation routes and safe (floodproof and seismically designed) bridges.

The city of Pawtucket used the mitigation matrix to recommend mitigation actions for three general categories of risk:

- 1 Residential structures vulnerable to flooding, fire, and high wind
- 2 Bridges and dams subject to flooding, earthquakes, and high wind
- 3 Buildings and service facilities vulnerable to earthquakes, flooding, and fire

2.2 Action Plan

1 Residential Structures Vulnerable to Flooding, Fire, and High Winds

EXISTING CONDITIONS

Significant flooding has occurred near the Moshassuck River in the vicinity of Greenville Street and Grotto Avenue and upstream of Mineral Spring Avenue. There are several wooden, multi-family housing units for the elderly on Mineral Spring Avenue that are at risk to flooding as well as wind and fire. There are 16 residential structures in the floodplain, most of which are older buildings that have not been brought up to current floodplain standards. Two of the insured structures have reported repetitive losses (more than two significant claims due to floods) since 1978—both cases occurred on Mineral Spring Avenue adjacent to the Moshassuck River. Minor damages were suffered after the last few hurricanes due to flooded sewer lines. Currently, the city is using sand bags to “Band-Aid” flooding problems. The city participates in a regular tree trimming maintenance program that helps protect property from fallen branches and helps keep rivers flowing free from blockage. There is no debris removal or disposal plan.

As mentioned previously, the city along with the Blackstone Valley Electric Company, New England States Emergency Consortium, and RIEMA conducts regular trimming of dead branches—especially near Slater Park—and replants trees with more compatible species to help reduce wind hazard. According to a study conducted by FEMA, if a hurricane similar to that of 1938 were to hit Pawtucket today, all single-family houses would be affected by high winds. In addition, 300 mobile homes outside the floodplain are subject to high winds.

TABLE 3 MITIGATION STRATEGIES FOR RISKS IN PAWTUCKET

TYPE OF MITIGATION							IMPLEMENTATION			
What is at risk?	Infrastructure Improvement/ Property Protection	Enhancing Natural Resources	Planning and Management	Regulatory Change	Preparedness to Reduce Losses	Education and Training	Responsible Person/Agency	Financing Options	Cost	Priority
Bell Atlantic Facilities	retrofit for earthquake	N/A	Bell Atlantic management plan	to be determined	generator, communications	N/A	NYNEX	tax credits	unknown	low
Blackstone Valley Electric Substation	maintenance, installation of seawall	N/A	private facility plan	floodplain regulation	flood warning, generator, communication	N/A	BVE CRMC	budget tax credit	unknown	low
City Hall Facilities	retrofit tower for wind, retrofit for flood and earthquake, relocate essential resources to first floor level, floodproof	N/A	local comprehensive plan	changes in building code	flood warning engineering study, generator, evacuation plan	building guidelines	city	budget grants	\$5,000 study	low
Dams (3)	repairs, maintenance	N/A	inspection, planning, maintenance	state law, revision if needed	alarm system for lead time evacuation	establish and practice evacuation routes	private CRMC*	tax credits	unknown	high
	install flood stage markers	N/A	inspection, planning, maintenance	state law, revision if needed	alarm system for lead time evacuation	establish and practice evacuation routes	National Weather Service local fire department	city resources	minimal	high
Filtration Plant	retrofit for earthquake	N/A	local comprehensive plan	changes in building code	communication system	N/A	PWSB	budget	unknown	medium
High Rise Structures (5 total)	repairs, maintenance, retrofit for wind and earthquake	N/A	local policy development	zoning, building code, rebuilding guidelines	evacuation plans	educate residents of risks, permitting and building guidelines	privately owned Pawtucket Housing Authority CRMC	low interest loans, grants, tax credits, land swap	cost would vary	medium
Industrial Areas (especially Mineral Spring culvert)	retrofit building, culvert repairs	N/A	wetland or floodplain restoration	local comprehensive plan, transportation improvement program	flood warning system and forecasting	N/A	private CRMC	tax credit, land swap	unknown	medium
Local Bridges	retrofit for earthquake, elevate low-lying bridges	tree and brush control	transportation improvement project	DOT standards	alternate traffic plans, flood warning and forecasting	demo projects	city/state CRMC	bond issue	unknown	low
Mobile Homes (+250)	improvement, removal, relocation or elevation; floodproof, retrofit for wind/earthquake; better tie-downs	wetlands or floodplain restoration	open space acquisition, local policy development	zoning, building code subdivision regulations, environmental regulations, impact fees, rebuilding guidelines	generators, communication systems, flood warning and forecasting, evacuation plans	signage, pamphlets, permitting and building guidelines	privately owned CRMC	low interest loans, grants, tax credits, land swap	cost would vary	medium
Narragansett bay Commission Treatment Facility	install floodproof seawall	N/A	Facility management plan	floodplain regulation, environmental regulation	flood warning, generator, communication	training of staff for emergency operations	NBC CRMC	budget, grants	unknown	medium
Older Masonry Structures	retrofit structures for earthquake	N/A	identify structures at risk	changes in building codes	financial incentives	training and code review	public, private	budget item, grants, tax credit	various	low
Public and Private Schools	retrofit for earthquake	N/A	local comprehensive plan	changes in building code	generator, communications, evacuation	training in evacuation procedures	city, private	bond issue, city capital improvement plan	unknown	medium
Residential Areas	improvements in sewer backup protection	nonstructural erosion control	local comprehensive plan	local ordinance	insurance, backup valves	media campaign	city, individuals	tax credits private	~\$300 per household	medium
Slater Mill	floodproof	N/A	local policy development	regulation change	engineering study	N/A	private	grants	unknown	medium
Wrecking Yard	gradual removal of yard	wetlands restoration	local comprehensive plan	zoning, environmental regulations	fence in yard	N/A	city, private, DEM	bond issue	\$5 million	high

* CRMC will need to review projects that take place within its jurisdiction if the project is proposing a change to existing conditions or requires a permit.

Mitigation Types and Examples:

- What is at Risk? Possible projects for mitigation
- **Infrastructure Improvement/Property Protection:** Repairs, improvements, maintenance, replacement, removal, new construction, relocation or elevation of buildings, floodproof, retrofit for wind/earthquake, land/building acquisition, floodwalls, berms, sewer backup protection
- **Enhancing Natural Resources:** Dune and beach nourishment, nonstructural erosion control, wetlands or floodplain restoration
- **Planning and Management:** Open space acquisition, local policy development, local comprehensive plan, harbor plan, CRS program plans
- **Regulatory Change:** Zoning, building code, subdivision regulations, environmental regulations, impact fees, development moratoria, rebuilding guidelines
- **Preparedness to Reduce Losses:** Generators, communication systems, wood chipper, flood warning and forecasting, evacuation plans, financial and insurance incentive
- **Education and Training:** Training of officials, demonstration projects, signage, pamphlets, media campaign, permitting and building guidelines
- **Financing Options:** Budget item, low interest loans, grants, tax credits, land swap, match
- **Cost:** Estimated cost of mitigation

This matrix was developed by the URI Coastal Resources Center and Rhode Island Sea Grant in collaboration with the Rhode Island Emergency Management Agency



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Besides the natural hazards that could affect residential structures directly, there is a wrecking yard located near several homes. If there were fire in this area, it could pose risk to surrounding houses, especially if there were hazardous materials in the wrecking yard.

ACTION - Revise Implementation Actions in Local Comprehensive Plan

- a) *LAND USE - Medium Priority.* Consider an expanded riverfront development district outside the floodway with design guidelines and historic district requirements.

Who: Department of Planning and Redevelopment, City Planning Commission, Coastal Resources Management Council (CRMC), Department of Environmental Management (DEM)

When: Short Term

Resources Available: Department of Planning and Redevelopment annual budget for comprehensive plan actions

Models: National Trust Information Series, Planning Association

- b) *LAND USE - High Priority.* Encourage neighborhood preservation/revitalization for floodproofing techniques and retrofitting for wind damage.

Who: Department of Planning and Redevelopment, City Planning Commission

When: Short Term

Resources Available: Community Development Block Grant funds

Models: FEMA materials

- c) *LAND USE - High Priority.* Develop guidelines for development along the Blackstone River keeping the floodway as entirely open space and elevating houses above the 100-year flood level.

Who: Department of Planning and Redevelopment, City Planning Commission, CRMC, DEM

When: Short Term

Models: FEMA materials

- d) *COMMUNITY SERVICES AND FACILITIES - High Priority.* Separate sanitary and storm sewers if feasible and incorporate best management techniques when undertaking new development or redevelopment projects.

Who: Department of Planning and Redevelopment, Public Works Department

When: Short Term

Resources Available: Local Capital Improvement Program funds

Models: American Planning Association

ACTION - Incorporate Hazard Mitigation into Project Review

- a) *HOUSING: Natural and Cultural Resources Element - Medium Priority.* For future proposed development design guidelines, review literature to incorporate hazard mitigation provisions, including improved maps.

Who: Department of Planning and Redevelopment, City Planning Commission, Historic District Commission, Division of Zoning and Code Enforcement

When: Short Term

Resources Available: R.I. Historical Preservation and Heritage Commission

Models: FEMA materials, National Trust Information Series

ACTION - Develop and Implement Public Education, Outreach, and Incentive Programs

- a) *HOUSING - Medium Priority.* Map vulnerable areas and distribute information on the location of these areas and the disaster mitigation program and projects.



Who: Department of Planning and Redevelopment, Fire and Police Departments

When: Short Term

Models: FEMA and URI Coastal Resources Center

- b) ECONOMIC DEVELOPMENT - High Priority.* Develop property tax incentives, such as credits or deductions for floodproofing measures or flood averse measures. Tax undeveloped land at a lower rate.

Who: Tax Assessor, City Council

When: Medium Term

Models: R.I. Hazard Mitigation Project, South Carolina Blue Sky Project

- c) HOUSING - High Priority.* Provide information to contractors and homeowners on risks of building in hazard-prone areas and inform builders and homeowners of the benefits of building and renovating structures to current standards. Provide the public with FEMA floodplain maps and other technical information developed by FEMA, state agencies, and other qualified institutions to assist the public with understanding the risks and the options for mitigation. Develop a list of appropriate techniques for homeowner self-inspection and subsequent implementation of mitigation activities.

Who: City Staff, State Agencies, Private Sector, Building Officials

When: Short Term

Resources Available: FEMA, Office of Statewide Planning-Flood Plain Management Program, Sea Grant fact sheets, Institute for Business and Home Safety (IBHS), Blue Sky Project, Clemson State University fact sheets on World Wide Web (WWW); FEMA WWW

Models: IBHS Retrofit Guidelines for one- and two-family residences

- d) COMMUNITY SERVICES AND FACILITIES - Medium Priority.* Maintain/upgrade sewer systems in flood-prone areas. Install backflow-prevention valves for CSO systems.

Who: Narragansett Bay Commission

When: Short Term

Resources Available: Low-interest bank loans

Models: Pawtucket's ISDS upgrade program, Greenwich Bay Initiative

- e) LAND USE - High Priority.* Incorporate a "hazard disclosure" requirement in deed transfers, leases, or other contracts for sale or exchange of lots within flood hazard areas. Such documents should also carry a flood hazard warning. Include such provisions in subdivision approvals.

Who: City Clerk, Planning Commission, Building Inspector, City Council, Realtors

When: Short Term

Models: Florida Model Flood Management Ordinance

ACTION - Determine Post-Disaster Mitigation Opportunities

- a) Schedule several meetings to provide information and receive comments on federal, state, and local performance after a disaster event - High Priority.*

Who: City of Pawtucket Emergency Management Agency, Public Safety Director, Fire and Police Departments

When: Short Term

Resources Available: Clemson State University fact sheets on WWW; FEMA WWW

Models: IBHS Retrofit Guidelines for one- and two-family residences



EXISTING CONDITIONS

There are four low lying bridges/culverts subject to flooding where branches from fallen trees could clog the drainage flow creating flooding: Interstate 95 over the Moshassuck River; Mineral Spring Avenue culvert over the Moshassuck River; Roosevelt Avenue bridge over the Blackstone River; and Exchange Street bridge. Main Street, Central Avenue, Interstate 95 over the Seekonk River, and Division Street are all high bridges that are in good condition and could be used for evacuation over the Moshassuck and Blackstone rivers.

There are a four major dams in the city, three of which are privately owned:

1. Pantex/Elizabeth Webbing Mill Dam (FERC No. 64) is owned by the Roosevelt Hydroelectric Company. This dam is located on the Moshassuck River. It was found to be in good condition and of significant hazard. This dam is considered as a significant hazard because failure could cause loss of life. The dam was inspected in 1982 and again in 1987 and found in good condition. Some remedial work was done in 1982 to remove tree limbs.

2. Slater Mill Dam/Pawtucket Upper Dam (No. 65) is owned by the Slater Mill Association. This dam is located on the Blackstone River. In July 1995, a 30-foot-wide hole was repaired. In August 1995, the electric company conducted an inspection because of foundation problems. Northeast Utilities repaired the sluice gate, but the base abutment still needs repair.

3. Main Street Dam (FERC No. 2) is owned by the Blackstone Valley Electric Company. This dam is located on the Blackstone River. In 1982, the dam underwent remedial repair with crushed stone. The last inspection was in 1986. The Army Corps of Engineers (COE) suggested that removal of the dam be considered. This is a low hazard dam in good condition, which means minimum property damage could occur with a dam failure, but no loss of life is expected.

4. Ten Mile River Reservation/Golf Club Dam is owned by DEM. This dam is located on the Ten Mile River and is considered low hazard.

According to the COE, as of November 1997, all dams were found in good condition. The Woonsocket Falls dam is monitored by computer sensors and is hooked up to an alarm system. As of July 1, 1997, three new alarms have been added to the Thundermist Hydroelectric Plant in Woonsocket. Currently, the city is working on installing some type of flood stage markers in order to monitor the Blackstone River level and buy some more lead time for evacuation.

ACTION - Revise Implementation Actions in Local Comprehensive Plan

a) **TRANSPORTATION - Low Priority.** In case of high winds, a formal procedure should be in place for closure of bridges and creation of alternative evacuation routes.

Who: City Officials, Public Works Department, Public Safety and Local Police Departments

When: Short Term

b) **TRANSPORTATION - Medium Priority.** Implement bridge repair and rehabilitation to Conant Street and Cole Street bridges and others as identified through the R.I. Department of Transportation (RIDOT) Bridge Repair Program.

Who: RIDOT, Department of Public Works

When: Long Term

Resources Available: State transportation bond issues

ACTION - Incorporate Hazard Mitigation into Project Review

a) **COMMUNITY SERVICES AND FACILITIES - High Priority.** Project review should include evaluation of the impact of proposed development on evacuation routes. Mitigation (e.g., road upgrade, culvert upgrade, new road) should be required where new development may affect evacuation. Also, evacuation routes should be practiced.

Who: Department of Planning and Redevelopment, Public Works Department

When: Short Term



Resources Available: R.I. Geographical Information Systems, COE National Hurricane Center's sea, lake, and overland surges from hurricane (SLOSH) computer model, RIEMA

b) COMMUNITY SERVICES AND FACILITIES - Medium Priority. High wind events will cause old and weakened trees to fall, creating a great amount of debris that must be picked up and disposed of either within Pawtucket or the central landfill. This debris often gathers underneath bridges, which will affect water flow. A plan listing disposal locations and most suitable sites should be created. Regular tree pruning and replanting should be continued.

Who: Department of Planning and Redevelopment, Public Works Department

When: Short Term

Resources Available: RIEMA

c) COMMUNITY SERVICES AND FACILITIES - High Priority. Stream gauge and flood stage markers should be installed in several key locations along the Blackstone River in order for the National Weather Service to monitor the water level and better predict the lead time along the river.

Who: Pawtucket Fire Department, Public Works Department, the National Weather Service, USGS

When: Short Term

Resources Available: National Weather Service, Northeast Region

ACTION - Develop and Implement Public Education, Outreach, and Incentive Programs

a) COMMUNITY SERVICES AND FACILITIES - High Priority. Provide a training program. Organize and conduct training opportunities for officials, employees, boards, and commissions regarding natural hazards and hazard mitigation.

Who: City Officials, Board and Commission Members

When: Medium Term

Resources Available: RIEMA, URI Coastal Resources Center

ACTION - Determine Post-Disaster Mitigation Opportunities

a) Document problems associated with disasters for future mitigation activities - High Priority.

Who: City Staff, RIEMA

When: Medium Term

Resources Available: RIEMA, FEMA

b) Reevaluation of evacuation plan for the city - High Priority.

Who: City Staff, RIEMA, Fire and Police Departments, Pawtucket School Department

When: Short Term

Resources Available: RIEMA, FEMA

3 *Buildings and Service Facilities Vulnerable to Earthquakes, Flooding, and Fire*

EXISTING CONDITIONS

Currently, 32 structures in the floodplain are vulnerable to basement flooding, including City Hall, which is situated at the lowest elevation in the city. Slater Mill, a national historic landmark and tourist attraction, is also on the bank of the Blackstone River. The city has contacted officials at Slater Mill to explore possible floodproofing measures. The city has also made an effort to contact local businesses that are in the floodplain. Pawtucket officials plan to continue this effort if federal grants are available for public education.



Land use and site selection for critical facilities is key. McCoy Stadium is one of the major economic structures subject to earthquake damage because it is built on filled land that was once a pond. Some of the risks from earthquakes include building collapse, disruption of sewer lines, water lines, and land communication lines.

Earthquakes are a greater risk than most people realize. There have been 31 recorded earthquakes in this state over the last 220 years. Rhode Island can feel the effects of an earthquake occurring in the Northeast Region. Rhode Island has experienced several minor earthquakes in the last few years, but no extensive damage has occurred.

Fire is another risk in Pawtucket because of the closely built urban environment. Many of the wooden structures are close together which would allow fire to spread easily.

ACTION - Revise Implementation Actions in the Local Comprehensive Plan

- a) **COMMUNITY SERVICES AND FACILITIES - High Priority:** Review plans for adequacy of design to meet drainage requirements. Make storm drainage improvements.

Who: City Engineer, Public Works Department

When: Short Term

Resources Available: City annual budget

Models: Engineering design manuals

- b) **COMMUNITY SERVICES AND FACILITIES - Medium Priority:** Implement building repairs, revise code requirements and routine maintenance recommendations.

Who: Public Works Department

When: Short Term

Resources Available: Annual Capital Improvement Program

- c) **NATURAL AND CULTURAL RESOURCES - High Priority:** In cooperation with DEM, assess the water quality impacts and potential fire hazard of material salvage yards along the Blackstone and Moshassuck rivers and implement mitigation measures as required.

Who: City of Pawtucket, DEM, CRMC

When: Short Term

Resources Available: State transportation bond issues

- d) **COMMUNITY SERVICES AND FACILITIES - High Priority:** Maintain publicly owned buildings and facilities in accordance with sound building maintenance procedures, and implementing structural modifications that ensure the overall integrity of the buildings, including handicapped accessibility.

Who: City of Pawtucket

When: Short Term

Resources Available: FEMA, revised state building codes

- e) **COMMUNITY SERVICES AND FACILITIES - Medium Priority:** Initiate the examination and retrofitting of unreinforced concrete structures and other types of structures for earthquake and flood protection.

Who: Private Industry, State of Rhode Island, Narragansett Bay Commission

When: Short Term

Resources Available: Tax credits

ACTION - Incorporate Hazard Mitigation into Project Review

- a) **NATURAL AND CULTURAL RESOURCES - High Priority:** Provide design assistance and design review guidelines for historic and nonhistoric structures, including possible retrofitting measures for flooding, fire, and earthquake mitigation.

Who: Department of Planning and Redevelopment, Historic District Commission

When: Ongoing and Short Term



Resources Available: City annual budget

Models: National Trust Information Series, "Safeguarding Your Historic Site" (FEMA-Region I)

- b) COMMUNITY SERVICES AND FACILITIES - High Priority.* Upgrade publicly owned buildings and facilities in accordance with sound building maintenance procedures, and implement structural modifications that ensure the overall integrity of the buildings, including handicapped accessibility.

Who: City of Pawtucket

When: Short Term

Resources Available: FEMA, revised state building codes

ACTION - Develop and Implement Public Education, Outreach, and Incentive Programs

- a) SERVICES AND FACILITIES - Low Priority.* Participate and help organize statewide public education sessions to explain flood and earthquake hazards, and follow up with modification to the state building code.

Who: RIEMA, FEMA, Rhode Island Builders Association, State Building Commissioner

When: Medium Term

- b) HOUSING - High Priority.* Revise local building assessment practices to include stricter assessments and to include retrofitting suggestions.

Who: State of Rhode Island

When: Medium Term

ACTION - Determine Post-Disaster Mitigation Opportunities

- a) Evaluate the feasibility of replacing undersized culverts with properly sized facilities - High Priority.*

Who: Public Works Department, RIDOT

When: Post-disaster

Resources Available: Local and state bond issues disaster funding

- b) Incorporate adequate drainage facilities into design for road repair - Medium Priority.*

Who: Public Works Department, RIDOT, CRMC

When: Post-disaster

Resources Available: Local and state bond issues disaster funding

- c) Acquire land susceptible to fire for conversion to open space - Low Priority.*

Who: City of Pawtucket, State of Rhode Island

When: Short Term

- d) Conduct a structural review of facilities affected by the disaster - Medium Priority.*

Who: City Staff, RIEMA

When: Medium Term

Resources Available: RIEMA, FEMA

2.3 Implementation Schedule

The LHMC realized that assigning a time frame to each recommended mitigation action is important so that activities are coordinated with other important governmental functions, such as budget hearings. Assigned time frames also provide a guideline for tracking the progress of all activities. Time frames are incorporated in Section 2.0.



2.4 Strategy Adoption

Pawtucket's Hazard Mitigation Strategy was approved for adoption by the LHMC and the city planning commission on October 21, 1997, and by the City Mayor on February 11, 1998. The next step was to gain the approval of the SHMC, the executive director of RIEMA, and FEMA Region I.

The members of the LHMC, along with the city planning commission, will recommend that these actions become amendments to the Pawtucket Comprehensive Plan. These actions will need city council approval as amendments to the comprehensive plan.

2.5 Implementation, Evaluation, and Revision of Strategy

"The success of the hazard mitigation plan is measured by the degree to which actions are accomplished. Without the implementation and maintenance of the plan, the previous components have merely been an effort in research void of any practical application."
—Tennessee Emergency Management Agency

Implementation

In order to establish the authority and accountability for implementation, Pawtucket suggested amendments to its comprehensive plan to incorporate the theme of natural hazard mitigation. The second step was to continue to implement actions that enable preventive or protective measures to be accomplished. The third step was to prioritize the recommended actions based on criteria the community established (see mitigation matrix). Pawtucket is now acting on securing sufficient resources to carry out these recommended actions.

Evaluation

The LHMC and other local officials plan to meet every six months to ensure that the mitigation actions are being implemented in accordance with the assigned time frames and that the strategy is updated. They will monitor and document progress.

Revision

The local strategy will be updated once a year. The update should be reviewed and submitted to RIEMA upon local approval to ensure that the state hazard mitigation strategy also remains current.

Statement from the LHMC:

"The LHMC will meet biannually after a disaster event to monitor, evaluate, and update this local strategy. An annual meeting will be advertised and within two months of this meeting, a status report will be given to the planning commission and city council. This strategy will then be approved by a local governing body and submitted to RIEMA for final approval."



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in Pawtucket,
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Don Boshman and David Choppy, Rhode Island Department of Environmental Management, Division of Dam Safety

Victor Parmentier, Rhode Island State Floodplain Manager, State Division of Planning

Michele Steinberg, FEMA Region I Mitigation Division

David Stroud, Insurance Services Organization



Strategy for
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Natural Hazards
in Pawtucket,
Rhode Island



Appendices

- A. Technical and Financial Assistance for Mitigation
- B. Existing Protection Systems-Federal and State
- C. Public Information and Outreach



Strategy for
Reducing
Risks From
Natural Hazards
in Pawtucket,
Rhode Island

Technical and Financial Assistance for Mitigation

State Resources

Rhode Island Emergency Management Agency

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

Coastal Resources Center

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

Coastal Resources Management Council

Stedman 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

State of Rhode Island Building Committee Office

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

Rhode Island Builders Association

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

Department of Transportation-Design Section/Bridges

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

Rhode Island Department of Business Regulations

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

State Fire Marshal's Office

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

Rhode Island Banking Commission/ Associate Director

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

Public Utilities Commission

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

Department of Environmental Management

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



Strategy for
Reducing
Risks From
Natural Hazards
in Pawtucket,
Rhode Island

Federal Resources

Federal Emergency Management Agency

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

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. Department of Commerce

National Weather Service

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

Economic Development Administration

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

U.S. Department of the Interior

National Park Service

Rivers and Trails Conservation Program
Regional Office
15 State Street
Boston, MA 02109
(617) 223-5203

U.S. Fish and Wildlife Service

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

U.S. Department of Housing and Urban Development

Community Development Block Grants
Region I - O'Neill Federal Building
10 Causeway Street
Boston, MA 02222
(617) 565-5354

Small Business Administration

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

U.S. Environmental Protection Agency

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



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 publications. 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

Organizations, 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 organizations, 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 floodproofing 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 WWW 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. Contact: Nicholas Winter, chairman, at (617) 727-0488 or the NEFSMA home page on the Web at <http://www.seacoast.com/~nefsma>.



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 project 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 RIEMA at (401) 946-9996.

Economic/Community Development

There may be programs existing to help floodproof 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

Your 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. 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 your 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 regulations 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 a 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.

State Barrier Beaches

Your community may have barrier beaches, as defined by the state's Coastal Resources Management Program. The regulations applying to these areas are enforced by CRMC. These regulations restrict alteration of the beach and/or dunes and the construction of coastal engineering structures. New or substantially reconstructed buildings generally must be elevated to a minimum of 1 foot above base flood elevation. No new commercial development is allowed on barrier beaches. If a structure is damaged more than 50 percent, it cannot be rebuilt.

Warning Systems and Emergency Operations Plans

Your community may have a flood warning system in place and should have a plan for response to flooding. In addition, RIEMA has offices throughout the state that maintain area-wide plans for flood events.



Federal

Coastal Barrier Resource Act

Administered by the U.S. Fish and Wildlife Service, this program has mapped public and private land identified as undeveloped coastal barrier areas. These areas may be denoted as “Otherwise Protected Areas” if they are owned by public entities. In the coastal barrier areas shown on FEMA’s flood insurance rate maps, structures newly built or substantially improved after the date shown on the maps are ineligible for federal flood insurance. This serves to restrict new development in these areas because the purchase of flood insurance is required to obtain federally backed mortgages and improvement loans for structures located in special flood hazard areas.

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 extremely helpful in meeting the state’s 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-floodproofing, 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 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) floodproofed 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 floodprone property.



Strategy for
Reducing
Risks From
Natural Hazards
in Pawtucket,
Rhode Island



Strategy for
Reducing
Risks From
Natural Hazards
in Pawtucket,
Rhode Island

Public Information and Outreach



Strategy for
Reducing
Risks From
Natural Hazards
in Pawtucket,
Rhode Island

Providence Journal-Bulletin

October 30, 1997

Charlestown, Pawtucket plan ahead for next big storm

■ State officials urge other communities to follow suit by taking measures to lessen damage from a severe hurricane.

by **PETER B. LORD**
Journal-Bulletin Staff Writer

WARWICK—For years experts have been warning Rhode Island that it's way overdue for a big hurricane. Yesterday two communities—Charlestown and Pawtucket—were praised by state officials for having actually done something about the next “Big One.”

Charlestown appears to be the first community in the country to incorporate storm planning into their town's comprehensive plan of development.

The town already has used a \$10,000 grant to raise the level of the main access road to Charlestown Town Beach so it's less likely to be submerged during storms.

And yesterday, state officials announced the state's Emergency Management Agency is giving the town \$108,000 to start showing property owners how they can protect the hundreds of houses in flood-prone areas along the town's barrier beaches and ponds.

State officials yesterday touted both communities as models for the kind of planning they want to see done in all of Rhode Island's communities during the next three years.

“We want people to know that money is coming down from Congress for local hazard mitigation efforts and they should put together plans like the ones in Charlestown and Pawtucket,” said Raymond LaBelle, director of the state's Emergency Management Agency.

As part of the new efforts, the state will soon distribute weather radios to each of the state's school superintendents, LaBelle said.

And just last spring, the state building code was amended to require that new structures are built with

protection against damage from high winds, which can rip roofs off buildings and buildings off foundations.

About 140 local officials attended a conference on local storm planning at the Inn at the Crossings sponsored by the state Emergency Management Agency, the insurance industry and the University of Rhode Island's Coastal Resources Center. The state has hired the CRC to help towns prepare their storm plans.

Because of the billions of dollars in damage caused by Hurricane Andrew in Florida and the Midwest floods recently, there's a new push on by insurance companies and federal disaster officials to help communities do something to prevent damage from future storms, said Virginia Lee of the Coastal Resources Center.

In Rhode Island, state officials focused their initial efforts on the South County shoreline and the Blackstone Valley, Lee said. Both areas face major storm impacts in different ways: South County can expect heavy seas, while the Blackstone Valley's big concern is flooding.

David Vallee, a hydrologist with the National Weather Service, warned the disaster experts that it's been a long time since they've seen a really severe storm.

“We haven't had a direct hit since 1960—Hurricane Donna,” Vallee said. “Think of all the construction that's happened since then.”

The last era of major storms was in the 1950s, he said. Hurricane Carol in 1954 left 19 people dead, caused \$90 million in damages and obliterated the summer colonies in Misquamicut and Weekapaug. Twelve days later, Hurricane Edna caused less damage but knocked out power and communications. The next year, Hurricane Diane dropped 6 inches of rain, triggering the worst flood in the state's history. The Blackstone River spread 1 1/2 miles

wide, two people were killed and damages topped \$170 million.

Although the storms since then have been comparatively minor, Vallee said experts believe hurricanes are cyclical and the big ones will return.

Two more-recent hurricanes, Bob and Gloria, were really just tropical storms when they reached Rhode Island, Vallee said.

A survey of marinas on Narragansett Bay showed none could stand up to a real hurricane, Vallee said. “Boats will become lawn ornaments.”

He said the communities along the Pawtuxet River—Scituate, Cranston, Coventry, Warwick and West Warwick—should consider creating a flood warning system.

“Does anyone have a plan is the dam at the Scituate Reservoir lets go?” he asked.

Pam Pogue, who heads the storm planning efforts at URI, said officials should be concerned about the state's 1,000 bridges and 400 dams. Many are in disrepair.

Charlestown Planner Nancy Hess said her community has adopted its hazard mitigation plan into its town comprehensive plan, so the town can try to avoid allowing new developments in flood-prone areas and it can beef up bridges and culverts.

The town plans to make a video advising people how to strengthen their houses, to elevate two houses as demonstration projects, and increase its tree-trimming efforts so downed trees don't close roads.

Along the town's beaches the new plan recommends dune restoration efforts and retrofitting bathhouses. It calls for dredging the Charlestown Breachway, creating fire lanes in Burlingame State Park, inspecting local dams and posting flood stage markers. ■

Providence Journal-Bulletin

August 16, 1996

Business as usual doesn't work with Mother Nature

By **RAYMOND LABELLE**
and **PAM RUBINOFF**

We are in the midst of the hurricane season and Rhode Islanders once again expect to be spared "The Big One." But it is not usual for the Ocean State to escape hurricane season unscathed. Rhode Island is known to have experienced at least 15 hurricanes in the 20th century. Although the past 35 years have seen a relative lull, the devastation from seven major events in the 1938-61 period (all of which hit in August and September) should be remembered as we enjoy the end of our summer season.

The National Weather Service and atmospheric scientists warn that we will see more frequent and intense hurricane activity over the next quarter century, like last year's record number of hurricanes for the Atlantic season. In recent years, the United States has suffered a series of increased natural disasters: earthquakes on the West Coast, floods in the Midwest and hurricanes in the Southeast have devastated communities, costing billions of dollars for clean-up and rebuilding, bankrupting insurance companies and draining government coffers.

Here in Rhode Island we have become complacent in our practices. Despite over \$300 million in damages and over 200 lives lost from the hurricanes of 1938 and 1954, we have rebuilt in many vulnerable areas. Hundreds of buildings are in high flood zones and on the front line of the next large storm surge. Most coastal residents and tourists have not experienced a major storm event and therefore have no experience in preparing for or responding to natural disasters. Over 80,000 Rhode Island residents live in areas susceptible to flooding, and property valued at over \$83 billion is at risk from coastal flooding and wind storms. Our economy is also extremely vulnerable to natural disasters - Hurricane Bob, which struck the northeast coast in August of 1991, caused over \$60 million in marine losses alone; the Great Blizzard of 1978 resulted in an estimated \$10 million in lost production and wages. Clearly with such experience, cost and knowledge, we can't continue to do business as usual.

Averaged over the past 20 years, natural disasters have cost the United States one-quarter billion dollars each week; emptying our pockets in one way or another through increased insurance premiums, taxes or a higher cost of doing business. Such costs are not sustainable by either the public or private sector, or the public at large. Imagine going to your insurance company to collect payment after a Hurricane Andrew-type storm only to find that they have gone bankrupt. Will state government then bail you out with taxpayer-funded insurance pool? No. The Rhode Island budget is already depleted, with no

pool of funds left to pay for the clean-up of another natural disaster.

The federal government, equally challenged with the call for fiscal responsibility, has been given a wake-up call. The past few years of payouts for natural disasters nationally has proved that the current cycle of building, insuring and rebuilding again in vulnerable areas is not sustainable economic or social policy.

The new motto of the Federal Emergency Management Agency (FEMA) - *Hazard Mitigation is the cornerstone of the emergency management* - reflects a different way of doing business, where resources and funds are being allocated to prevent damages *before*

disaster strikes. Proactive measures such as flood-proofing the first floor of town hall, or acquiring vulnerable shorefront land for open space, can significantly reduce the cost of clean-up and rebuilding, while reducing the emotional toll that a community suffers when hit by a natural disaster.

Over the past year, the University of Rhode Island's Coastal Resources Center, Rhode Island Sea Grant and The Rhode Island Emergency Management Agency have worked with FEMA, various state agencies, numerous local officials and a broad spectrum of private industry to establish a framework for developing strategies to minimize vulnerability to natural hazards. Prior to this effort, there was no mechanism in Rhode Island for local and state agencies to work together in a proactive way to reduce damages and costs from natural disasters.

Although we may not have control over the cause of disasters, we certainly do have the ability to reduce our risks and protect our investments in the development and in the economy of Rhode Island. Local officials in South County and the Blackstone River valley have begun to identify risks to their communities - municipal buildings in floodplains, inadequate shelters for evacuations and/or increased conversion of seasonal cottages to year-round homes in disaster-prone neighborhoods. Creative actions are being developed to mitigate or reduce these risks through education, awarding grants for retro-fitting existing structures or providing incentives that encourage residents to build wisely. Many improvements at the government or homeowner level can be made at little or no up-front cost if thought out carefully and combined with other ongoing projects.

Rhode Islanders do have a choice: plan now or pay later. As federal dollars for disaster assistance dry up and insurance policies become harder to obtain, there may not be a choice unless proactive planning takes place. Homeowners can take this time to assess their own vulnerability. Do you

have hurricane shutters? Can you install hurricane clips on your roof when you repair it? Do you know where your local shelter is? Did you ask your Realtor if your new home is in a flood zone?

Behind the scenes, research at the University of Rhode Island contributes to our ability to reduce losses from natural hazards. Results from research on ocean temperature and hurricanes at the Graduate School of Oceanography have been incorporated into a new hurricane prediction model, giving us greater opportunity to protect ourselves from impending storms. For decades, the URI Geology Department has been the primary source of information on the coastal processes along our changing ocean beaches and Narragansett Bay shoreline. This research is much more than academic - it builds a foundation of information to help state and local officials make appropriate decisions and guide wiser development along vulnerable areas of the coast.

Public-private partnerships will be key to the success of hazard mitigation, specifically among the sectors of insurance, building, banking and real estate. The insurance industry, through the work of the Insurance Institute for Property Loss Reduction trade association, is working with Rhode Island's Hazard Mitigation Partnership so that government and business work cooperatively to everyone's benefit. By developing incentives for hazard mitigation for homeowners, business and government, there is the potential for the type of win-win collaboration between economic and environmental concerns that have been so rare in the past. The opportunity to implement community-based approaches for addressing natural hazards, complete with public-private partnerships, will serve as a models and provide the building blocks for statewide program for hazard mitigation.

The Rhode Island experience can also contribute valuable tools for other regions worldwide to promote hazard mitigation in the practical way that saves lives and money, and eliminates or reduces unneeded disruption to communities, while contributing to behavior of sustainable development in vulnerable areas. We are finally learning that business as usual will not succeed when one is dealing with Mother Nature.

- Raymond LaBelle is executive director of the Rhode Island Emergency Management Agency. Pam Rubinoff is a coastal management specialist at the University of Rhode Island's Coastal Resources Center and the Rhode Island Sea Grant program. ■

Providence BUSINESS NEWS

September 29 - October 5, 1997

Insurance agents wary despite dearth of storms

In case you haven't noticed, we're more than halfway through hurricane season and no major storms have affected the Northeast.

Still, many of the Ocean State's insurance agents are holding their breath as we proceed through the annual tropical cyclone season, which runs from June until mid-November, and can produce storms with winds upwards of 74 mph.

"My insurance agency actually goes out over water...whenever there's a hurricane we take everything that is not heavy out of the building," said Matthew F. Clark, president of Meredith & Clark Inc. in Jamestown. "Since 1984 we've evacuated the building three times...we basically leave the desks."

"We're holding our breath because it has been relatively calm season around here, although El Nino is wreaking havoc in California," said Margaret Sheehan, director of communications for the Institute for Business & Home Safety in Boston.

The IBHS is an insurance industry organization that focuses on reducing the impact of natural disasters. The organization changed its name in August from the Insurance Institute for Property Loss Reduction.

Last week IBHS sponsored a demonstration with the University of Rhode Island to show homeowners how they can try to minimize property damage. The demonstration included tips on installing hurricane clips, which help secure a roof during high winds, and fastening roof shingles. The home used for the demonstrations will also be used for

future training by the Hazard Mitigation Project and Rhode Island Building Commission.

"We must build smarter, stronger and safer structures. By doing so we will save lives, reduce the high cost of repetitive property damage, and along the shore protect what little is left of a fragile coastal habitat. It's a classic case of pay now, or pay later," stated Pam Pogue, manager of the Hazard Mitigation Project.

for the most part, many Rhode Island insurance companies start their education campaigns earlier in the year.

"There's a lot of information out there, but it's already been distributed. We're in the reminder stage," said Evertt Federici, executive vice president of the Independent Insurance Agents of Rhode Island.

Included among the information insurers distribute are safety tips, and reminders to move belongings that are in risky areas, such as basements that flood. Also, they remind clients that flood coverage is not offered through normal property insurance. Flood coverage must be purchased through a national program, which pays flood claims even if the president does not declare a disaster.

FEMA only provides flood assistance if the president declares a disaster, and in those cases assistance is only awarded about 50 percent of the time.

"Even though Rhode Island has been extremely fortunate in the last years, it can happen at any time," Federici said. Projects such as the one conducted by IBHS, he said, "should be a wake-up call to

everyone that good construction is what they're after."

In the last decade hurricanes have caused more damage locally, mostly because building along the coast has increased, according to several industry experts.

For instance, in 1991 Hurricane Bob cost Rhode Island insurers about \$106 million, according to statistics from the Division of American Services Group. The Federal Emergency Management Agency paid out even more money for damages caused by Bob.

"From strictly a personal standpoint, I had a difficult time placing...homeowners insurance for waterfront property as of July 1, 1993," Clark said. "That was because of Hurricane Andrew," which struck the area in 1992.

Reinsurance companies help firms such as Meredith & Clark cover losses that exceed what they can cover in a particular year.

Clark himself offers new customers with waterfront property insurance through Rhode Island Joint Reinsurance Association, which is a sort of an assigned risk pool for homeowners. Such policies cost about 30 percent more than typical insurance, he estimated. ■

Providence Journal-Bulletin

November 2, 1997

Storm knocks out power to thousands of homes

By **ARIEL SABER**
Journal-Bulletin Staff Writer

Pounding rains and winds yesterday knocked out power to thousands of homes in the region, flooded a few streets, and toppled the frame of a three-story apartment house.

By 10 p.m., nearly 1½ inches of rain had fallen on Rhode Island, and the National Weather Service had issued a high-wind warning for Washington and Newport Counties.

The service said east winds would reach speeds of more than 60 mph before diminishing around midnight.

In cities and towns around the state, the wind detached tree branches and ushered them into houses and cars, but there were no reports of serious injuries.

Debbie Peckham, 33, of Newport was driving along Rhode Island Avenue, near Old Beach Road, in Newport, at around 4:50 p.m. when a branch fell on her car, crushing the roof, the police said. She was taken to Newport Hospital, where she was treated for neck injuries and released, the police and a hospital official said.

The storm didn't discriminate.

Newport police officer Eric Adkins was driving to a house on Gibbs Street in response to a complaint of a fallen tree when his cruiser was struck by a wind-blown branch. The headlight was

shattered, but he escaped injury.

The wind left perhaps its biggest footprint on a low-income apartment house under construction on Bellevue Avenue near Dexter and Cranston Streets, in Providence's West End. The skeleton of the building, which is being built by the West Elmwood Housing Development Corporation as part of its Operation Hope Renewed project, collapsed last night and fell to one side.

The structure, which appeared to have been about three stories high, was reduced to a jumble of wooden planks, fallen metal scaffolding and upended granite slabs. The massive gabled roof sat atop the debris, tilting to one side.

No one was hurt.

Police cruisers blocked off the street last night in case more scaffolding broke loose.

In Newport, police shut down a street for another reason: coastal flooding. The combination of relentless rainfall and high tide turned Harrison Avenue, in the city's Ten Mile Drive area, into a lake, said Lt. Wayne Morrison. Officers closed the street at about 8:20 p.m.

A windsurfer in waters off Ruggles Avenue in Newport gave his friends a scare when he didn't show up as planned at Easton's Beach at about 1:30 p.m.

Newport fire crews searched the coastline and

found the man an hour later sitting alone on a beach near where he had launched. Coast Guard Petty Officer Mike Hathaway said the windsurfer had tried to do battle with a stiff easterly headwind but soon surrendered.

Electric company spokesman could not say exactly how many households in Rhode Island and Southeastern Massachusetts had lost electricity over the course of the day. But they offered a very rough estimate of 6,000.

About 850 households in Newport - one of the hardest-hit areas - remained without electricity as of 10 p.m. last night. Electricity was expected to be restored by midnight.

In East Providence, police said the storm set off burglar alarms at a few businesses and sent a tree branch onto a house on Mauran Avenue.

Heavy surf in Jamestown was pounding a sailboat onto the shore at the Conanicut Marina. "It's almost in the parking lot," said a witness.

With reports from staff writer Michael Corkery. ■

Hazard Mitigation Project retrofits Warwick house



Stopping by to check on the progress at 14 Pell Avenue September 20 are, from left, Pamela Pogue of the University of Rhode Island, Diana McClure of the Institute for Building and Home Safety (IBHS), Ted Sarno of the Warwick Building Dept., Peter H. Billing of IBHS, state Deputy Building Commissioner Daniel DeDentro and Ronald Reedy of the Construction Specifications Institute.

Volunteers retrofitted a Warwick home September 20 to provide examples of what homeowners can do to protect against substantive damage from the high winds and potential flooding of hurricanes and northeasters.

Volunteers and materials were provided by Home Depot, the Institute for Building and Home Safety (IBHS) and the Warwick Building Dept. Under the direction of the Rhode Island Hazard Mitigation Project, volunteers replaced the roof and retrofitted against wind damage by installing hurricane clips and sheathing with adhesives to secure the roof and roof covering. A temporary plywood hurricane shutter was added to a front window, the front entry door was reinforced with additional bolts and latches, and anchor bolts were installed to tie the house down to the foundation.

To mitigate flood damage from hurricanes and winter storms, flood barriers were put in around all basement windows at the back of the house.

The house is located at 14 Pell Avenue and will be used for demonstration and public education, according to Peter H. Billing, director of codes and standards for IBHS.

RIBA participates in the Rhode Island Hazard Mitigation Project, which also includes state and municipal agencies and insurance companies.

Rhode Island's property/casualty insurers in the R.I. FAIR Plan underwrote the retrofit through the R.I. Joint Reinsurance Association.

No new members were approved in October because the monthly Board of Directors meeting was preempted by the RIBA Annual Meeting.