Strategy for Reducing Risks From Natural Hazards in North Kingstown, Rhode Island

A Multi-Hazard Mitigation Strategy

October 2002

Purpose: The purpose of this report is to recommend actions and policies for the Town of North Kingstown to minimize the social and economic loss and disruption associated with natural hazard events. Hazard Mitigation is an ongoing process that will require continued implementation, evaluation, and revision. This report, coupled with an ongoing commitment to hazard mitigation from the Town and committee, is intended to preserve and enhance the safety, quality of life, and natural resources of North Kingstown.

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Cover picture is an aerial view of Wickford village and its harbor.
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1.0 – Introduction

Hazard mitigation is a set of actions and policies designed to reduce the impacts of naturally occurring disasters on people and property. Advances in the ability to predict the occurrence and effects of natural disasters, from severe storms to earthquakes, has provided government bodies with an opportunity to prepare for them. Disaster preparation can have enormous benefits in lessened loss of life, economic and social impacts, and post-disaster recovery time.

1.1 Benefits of Hazard Mitigation

The most immediate benefit of natural hazard mitigation planning is the reduction and elimination of the negative impacts of natural disasters in terms of lost life and property. With adequate preparation the Town can significantly reduce the economic and social disruptions caused by natural disasters and reduce the costs of recovery for the town, local businesses, and residents.

The Federal Emergency Management Agency (FEMA) offers three distinct incentives for the adoption of local hazard mitigation plans. Firstly FEMA's Pre-Disaster Flood Mitigation Assistance Program provides grants for activities designed to mitigate the effects of floods in a community. Funds from this grant can go to acquisition, relocation, and retrofitting of structures but are only available if an approved hazard mitigation plan is in place. Secondly, a hazard mitigation plan can expedite the approval process for receiving money after a federally declared disaster through the FEMA Post-Disaster Hazard Mitigation Grant Program. Finally, a mitigation plan can be counted towards credit points in FEMA's Community Rating System (CRS). Points are awarded for having the plan, as well as for going through the various steps involved in creating the plan, including having community involvement and coordinating with other agencies. The better a community's CRS score, the greater the discounts provided on individual property owner's National Flood Insurance Program (NFIP) premiums.

1.2 Goal Statement

The goal of this hazard mitigation plan is to identify areas at risk from natural hazards and develop policies and plans of action that could be implemented to reduce the impacts of natural hazards on the residents, properties, and natural resources of North Kingstown. A high priority is placed on protecting the safety of residents and visitors alike. The town's many historic buildings and coastal resources are of special concern.

1.3 Planning Process

The North Kingstown Hazard Mitigation Committee was convened in January of 2002 and included the Town Manager, Town safety officials, Department of Public Works, the Building Official, town planners, an RIEDC representative, community members, and representatives from the North Kingstown Chamber of Commerce. Meetings held on a monthly basis featured discussions of the goals of hazard mitigation, the risks North Kingstown faces from natural hazards, the Town's vulnerabilities, and steps the Town could take to reduce its vulnerabilities to those hazards. Technical aid, research, and meeting facilitation were provided by the North Kingstown Department of Planning and

Development. Maps developed by the University of Rhode Island Environmental Data Center using Geographic Information System data detail both hazard risks and vulnerabilities. These maps were reviewed by the committee and used as a guide in the initial plan discussions (Maps 1 & 2).

Public participation is an integral part of the planning process. In the data gathering stage and throughout the planning process, public input was achieved through additional committee members including representatives from South County Nursing and Rehabilitation Center, RI Air National Guard, and Amateur Radio. A workshop was held on September 19, 2002 to gather further input from the public at-large. Additional public comment was received when the Town Council reviewed the plan for adoption as an amendment to the North Kingstown Comprehensive Plan This action required a public hearing before the town council. The plan was also distributed to the surrounding communities of South Kingstown, East Greenwich, Exeter, Warwick, Narragansett and Jamestown for their review and consideration.

The creation of the North Kingstown Hazard Mitigation Plan implements Action NC.1.18.1 of the Town's Comprehensive Plan, which states, "Prepare a hazard mitigation plan." This action is included in the Natural and Cultural Resources element of the comprehensive plan under Goal NC.1Protect, Preserve, and Where Possible, Restore the Natural Resources of North Kingstown. The plan specifically addresses Objective NC.1.18, which calls for developing strategies to protect the community from the impacts of natural hazards. As stated above, If approved by the Town Council, the Hazard Mitigation Plan will be incorporated as an amendment to the Comprehensive Plan.

1.4 Existing Hazard Mitigation

There are many existing plans, policies, and reports that in some way contribute to or inform the hazard mitigation process in North Kingstown. The comprehensive plan has several different objectives and actions that can contribute to hazard mitigation. In the Transportation element, the plan calls for the creation of a bridge management program (Action C.1.9.2), which will ensure the continuous management and upkeep of the town's bridges, in effect making them more hazard resistant. In addition, the plan calls for improving roadway drainage (Action C.1.9.6) and improved storm water systems (Action C.1.9.7). Both of these actions will decrease the effects of flooding. In the Natural and Cultural Resources Element, Action NC.1.3.14 addresses reducing the amount of impervious surfaces in the town. Reduced impervious surfaces in flood zones can lower flood levels. The Community Services Element has many actions and objectives that can serve hazard mitigation including a new fire station at Quonset Point (Action CS.9.1.2) and providing for the secure storage and protection of vital town records (Action CS.14.2.3). Protection of the town's water supply is a critical component of this element, as reflected in Goal CS.8 Protect and Conserve Town Water Supply.

Actions to protect the water supply appear frequently in the comprehensive plan and other Town plans and documents. The Town has a Groundwater Protection Plan that forms the basis of the groundwater protection overlay zone. This overlay zone regulates the uses and densities that can locate in the aquifer area in an effort to protect the

Town's drinking water from contamination. The Water Supply System Management Plan has extensive actions that should take place in the event of natural or man-made disasters to protect the water supply from contamination. As an additional protection measure, the Town is committed to acquiring land and conservation easements in the groundwater protection areas. All of these actions limit the potential for groundwater contamination and ensure sufficient recharge of the aquifer, ultimately mitigating the effects of drought. Other pertinent documents include the North Kingstown Tree Inventory Management Plan. This plan recommends regular tree trimming to reduce the potential damage of utility lines from fallen limbs. The Emergency Operations Plan also includes a framework to assist Town officials in planning and performing their emergency functions during a disaster. In addition to hazard mitigation, other related issues addressed in the Emergency Operations Plan include preparedness -- aimed at saving lives and minimizing damage, response -- aimed at preventing the loss of lives, reducing property damage, and providing emergency assistance, and recovery – aimed at returning all systems to normal post-disaster. In addition, the Harbor Management Plan will be updated to incorporate a Storm Preparedness Plan, which will include many of the actions developed in the Hazard Mitigation Plan.

2.0 – Risk and Vulnerability Assessment

The risk of and vulnerability to various forms of natural hazards is determined by a myriad of factors. The geographic and natural features of the town play an important role in determining to what extent the town is at risk from natural hazards including hurricanes, wildfires and earthquakes. Vulnerability is essentially determined by identifying the town's weak points; weak points are those locations and features most susceptible to serious disruption or damage from natural hazards.

North Kingstown is a coastal community in the northeastern portion of the United States situated on the Narragansett Bay in the State of Rhode Island. The town is landlocked on three sides with the Bay forming its eastern boundary. The Hunt River forms the northern border of the town while the Annaquatucket and Pettaquamscutt (Narrow) Rivers both run through the southern portions of the town. Significant coastal features along the town's approximately 30 mile coast include Allen Harbor, Quonset Point, Wickford Harbor, and Bissel Cove. There are approximately 6,343 acres of wetlands (22.6%) and 14,085 acres of forest (49.8%) in the town.

Development in the town varies from the large industrial/business park of Quonset Point to the turf farms and low-density residential areas of Slocum. The majority of development in the town is single family residential. Based on the 2000 US Census, the population of North Kingstown is 26,326.

2.1 Risks Assessment

<u>Wind and Flood (Hurricanes, Nor'easters, Tornadoes)</u>

As a coastal community, North Kingstown is highly susceptible to the effects of hurricanes and nor'easters, especially the coastal flooding associated with these events. Hurricanes are tropical based storms that travel north up the Atlantic coast and feature

heavy rain and high velocity winds. Hurricanes occur in the late summer to early fall, as opposed to nor'easters, which are similar to hurricanes in effect but occur in the winter months. Both types of storm can cause large amounts of damage across a wide area. Tornadoes are very localized storms consisting of high velocity wind funnels and are very rare in Rhode Island, occurring once every few years in the state.

Table 1. Natural Hazard Events in North Kingstown

Name/Date of Storm	Damaged Areas
Hurricane of 1938	Historical marker in on the Gregory Building in Wickford village shows the high water mark from this storm. One hundred small cottage homes on Quonset Point were destroyed and nine people died there. Homes in Wickford were flooded, some destroyed. Many boats from the harbor were destroyed including the fishing fleet.
Earthquake - 1951	Epi-center in Kingston, measured 4.6 on the Richter Scale
Hurricane Carol - 1954	Historic Marker on the West Main Street Highway Garage in Wickford village shows the high water mark from this storm. Homes stripped from their foundations and upended at Poplar Point. Military facilities at Quonset Point flooded.
Wildfire - 1968	500 acres in the Slocum area
Wildfire - 1974	300 acres in the Slocum area
Blizzard - 1978	Town Services shut down for a week.
Hurricane Gloria - 1985	Boathouse at Town Beach was blown down and much sand was washed away. Salt spray led to extensive defoliation of trees.
Hurricane Bob - 1991	Boats washed ashore and piled on lawns fronting Wickford Harbor. Docks damaged.

There have been several severe storms, including hurricanes and nor'easters, which have caused significant levels of damage to North Kingstown (Table 1). Damage in these storm events come from two elements, flooding and wind. North Kingstown has land area in all three levels of flood zones as designated by FEMA. Floodplains in the town include "A" zones subject to a 100-year flood, "V" zones subject to a 100-year flood characterized by breaking wave action, and "X" zones subject to a 500-year flood.

The hundred-year flood has a base one percent chance of occurring in any given year. The National Hurricane Center's Sea, Lake, and Overland Surges from Hurricanes model (SLOSH) shows areas subject to inundation in the event of a hurricane (Map 1). These flood areas combined cover a significant portion of the town, including all coastal areas and a large amount of the stream, river, and wetland areas of the interior (Map 1 & 2). Development, including simply paving, can increase the height and extent of flood areas due to the loss of permeable ground surfaces. Future sea level rise and erosion will increase the area and extent of damage caused by coastal flooding. The Coastal

Resources Management Program has documented shoreline change and average erosion rates. A single large storm event can drastically change the shoreline depending on coastal soil conditions. Flood damage comes from both the presence of the water and its ability to carry large pieces of debris such as boats and houses into other houses and structures. Roads running perpendicular to the coast can act as surge channels, carrying the storm surge further inland at a higher rate and concentration.

Boat damaged and washed ashore during *the 1938 Hurricane. Photograph courtesy of Richard Bowen.*

Wind damage is another significant aspect of coastal storms and has its most direct effect on coastal buildings. Wind speed can drop dramatically as one moves inland, falling 70 to 80 percent one-half mile to one mile inland (Planning for Post-Disaster Recovery and Reconstruction, 1998). Windblown debris broken free from buildings and trees can also be dangerous during a storm. Clean up and damage repair from wind can be very expensive.

Table 2. Hurricane Class Table*

Class	Wind Speed (MPH)	Storm Surge (FT)
1	74 - 95	4 - 5
2	96 - 110	6 - 8
3	111 - 130	9 - 12
4	131 - 155	13 - 18
5	> 155	> 18

* Based on the Saffir/Simpson Hurricane-Scale Ranges

Hurricanes are classified by wind speed into five types. Table 2 outlines these five hurricane classes. Rhode Island is considered to be susceptible to a direct landing of storms from Classes I through IV. Rhode Island has an increased susceptibility to hurricanes due to its position, along with Connecticut and Massachusetts, on a landform that juts eastward into the Atlantic Ocean.

In addition, hurricanes reaching the New England region experience an increase in forward motion that compensates for decreased wind speeds so that lower class hurricanes can potentially cause considerably more damage than would normally be expected. Finally, the configuration of the Narragansett Bay can have a funneling effect on the tidal surges accompanying hurricanes causing high levels of coastal flooding in the upper portions of the bay. Since 1900, 33 hurricanes have directly or indirectly

struck Rhode Island, so one can easily expect further hurricane activity in the future (Rhode Island Hurricane Evacuation Study Technical Data Report, 1995). If the predicted effects of global warming are correct, than hurricanes and other severe storms will occur with more frequency and intensity in the future, increasing the chances of a hurricane reaching Rhode Island's shores. The Town has registered for the Hurrevac 2000 software program developed jointly by FEMA and the Army Corp of Engineers. This program will alert the Town to approaching hurricanes through live data files from the National Hurricane Center via the Internet at www.hurrevac.com/about_win.htm. As these files are received, the program processes the data and analyzes the threat posed to the community from a particular storm allowing town officials to make informed decisions as to the Town's response.

Poplar Point property after the 1938 Hurricane. Photograph courtesy of Richard Bowen.

The most significant storm to hit North Kingstown was the hurricane of 1938, a category three storm. Wind speeds as high as 121 miles per hour were reported and there was severe coastal flooding.

The following has been taken from a first-hand account of the 1938 hurricane written by Alice Armington of Poplar Point on September 21, 1938.

"*…I wandered around from window to window looking out on a boiling ocean with wharves and boats and big timbers being towwed about like rubber balls…Then the cellar doors on the water side blew in and the winds rushed up through the floors and all the linoleum rose up…I looked out the south window to where the Richardson house should be, nothing there…Both that house and garage and the Kilgus house and garage had been torn to kindling wood and carried across the road and into the lots beyond…About an hour after I got out of the larger house, it split up and was carried off into the lot across the road…By some miracle it didn't hit the cottage where I was as it went by."*

In the hurricane of 1938, a summer colony at Quonset lost 100 cottages and nine people were killed. Many homes were destroyed throughout the town and Wickford village in particular was hard hit. Students were trapped overnight in Wickford Elementary School and many of the elm trees lining Main Street were downed. A bronze plaque at the corner of Main and Brown Streets shows the historic high water mark from this storm.

Poplar Point property after the 1938 Hurricane. Photograph courtesy of Richard Bowen.

Wildfire

While fire is now known to have an important regenerative role in many ecosystems, many factors, natural and manmade, can combine to create devastating natural disasters far beyond the effects of natural wildfire processes. Drought conditions, coupled with a build-up of dead underbrush and other kindling can lead to a fire, with the presence of a spark. Such a situation is especially dangerous when there are a number of homes present in forested areas, as is the case in parts of North Kingstown. Firefighters use different and often incompatible methods when fighting wildfires as opposed to home fires. In addition, the presence of homes precludes the ability to conduct controlled burns in order to keep the amount of kindling low and mitigate large-scale wildfires. Access to both the site and to a water source is another important issue that can affect how intense and potentially damaging a wildfire can be (Planning for Post-Disaster Recovery and Reconstruction, 1998).

As of 1999 almost 50 percent of North Kingstown's total acreage was forested. While this percentage has fluctuated over time, there have been very few wildfire occurrences in the town and none of these have caused great amounts of damage or burned on a large, uncontrolled scale. The two largest fires in North Kingstown's recent history occurred in 1968 and 1974 in the Slocum area. Sparks from the adjacent railroad tracks

lit both of these fires, which burned in an area exceeding 500 and 300 acres respectively.

Poplar Point home after a snowstorm event.

Ice and Snow

Though generally outside of the extreme winter weather areas of the Northeast, Rhode Island is still subject to possible heavy winter weather events including significant snow and ice accumulation. Snow accumulation can cause serious damage to structures, especially those with flat roofs, and possibly cause roof collapse. The combination of ice and wind can bring down utility poles, leading to a variety of problems with communication and electricity loss. Snowmelt can lead to flooding well after the actual snowstorm has past.

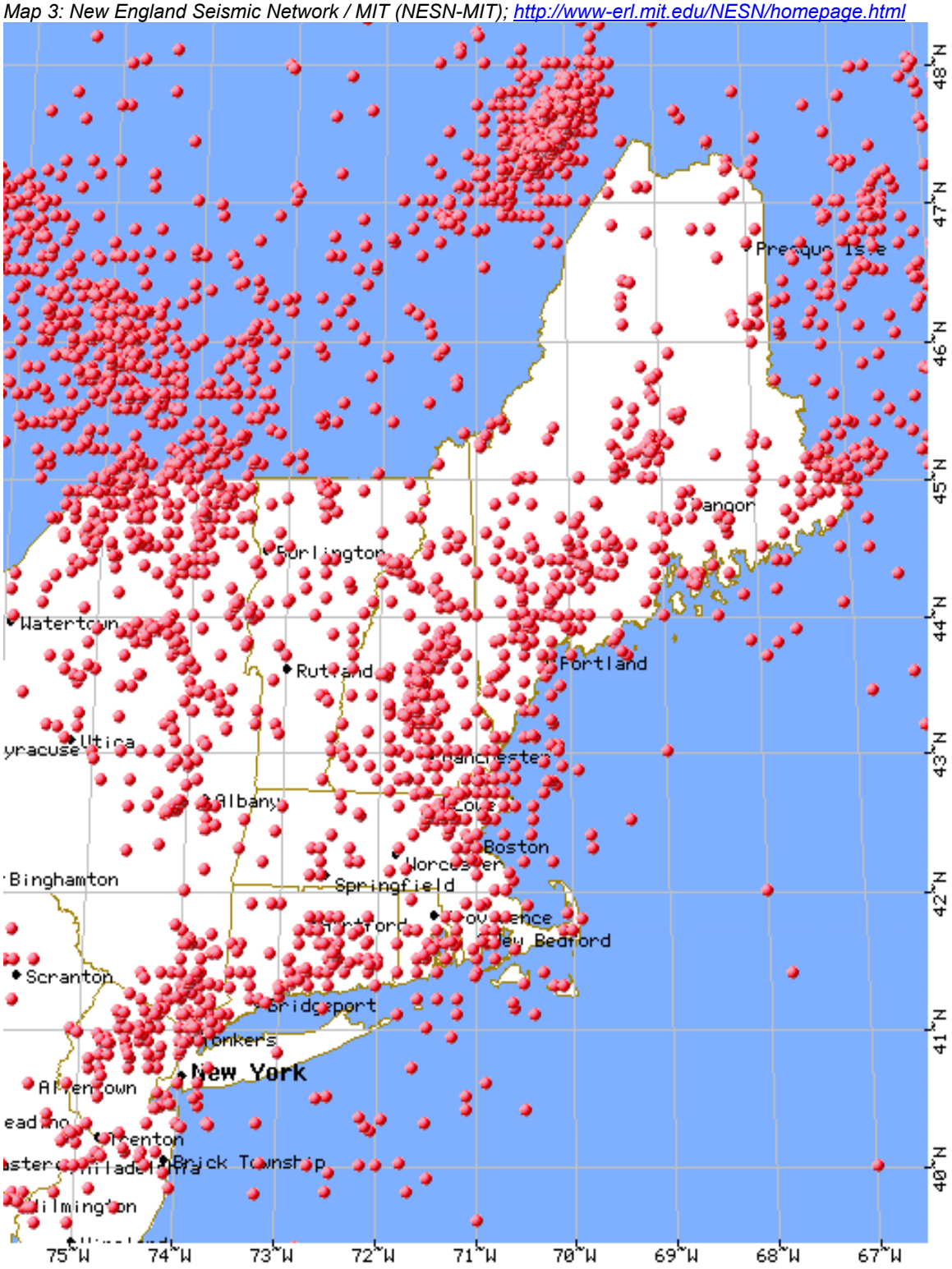
A snow-covered West Main Street in Wickford during the 1890s looking west towards Route 1.

Earthquake

An earthquake is an abrupt release of accumulated strain on the Earth's tectonic plates occurring along a fault line. Damage in an earthquake stems from ground motion, surface faulting, and ground failure in which weak or unstable soils, such as those composed primarily of saturated sand or silt, liquefy. The effects of an earthquake are mitigated by distance and ground materials between the epicenter and a given location (Planning for Post-Disaster Recovery and Reconstruction, 1998). An earthquake in New England affects a much wider area than a similar earthquake in California due to New England's solid bedrock geology (NESEC).

While there is a low probability of an earthquake occurring in Rhode Island, it is not an impossible event. There have, in fact, been 15 earthquakes since 1928 with one in June 1951 registering a 4.6 on the Richter Scale centered in Kingston. Narragansett Bay is considered a regional hot spot for earthquake activity, with many of the past quakes occurring in the bay or its immediate vicinity. Map 3 from the New England Seismic Network/MIT displays the past earthquake activity in New England.

Map 3: New England Seismic Network / MIT (NESN-MIT); http://www-erl.mit.edu/NESN/homepage.html



Drought

While there are no universally accepted definitions of drought, and the conditions that are labeled as drought can vary from region to region, drought can be generally defined as a period of drier than normal conditions over a large area, which, in some manner, reduces water levels. Droughts are different from other natural hazards in that they do not consist of a short, easily defined event such as a hurricane or an earthquake, but instead they gradually appear, last for a time period, and then gradually return to normal. Drought conditions can last for weeks, months, even years. Droughts can have serious economic, social and environmental effects on an area. Crops and livestock can be lost, industries can lose productivity, and wildlife habitat can be destroyed. Cumulatively these effects can easily equal the cost of a severe hurricane or other natural disaster. As aquifer levels are drawn down, seawater can be drawn into wells located near the coast (RI Drought Management Plan).

Precipitation levels vary widely from region to region and from year to year. In New England, the average yearly precipitation is 40 to 60 inches. A drought becomes apparent after a period of time over which there are lower than normal precipitation levels. Stream and river flow is reduced, lake and reservoir levels fall, and groundwater is found at increasingly lower depths. As water availability becomes increasingly scarce, water use prioritization becomes necessary. Rhode Island is considered at risk to short-term droughts, which often occur in the summer months and long-term droughts, which on average appear once every eleven years. Droughts in Rhode Island most often begin with an abnormally dry winter (RI Drought Management Plan).

As of the creation of this plan, Rhode Island is facing drought conditions. Precipitation levels were labeled as severely dry over the winter and continued as moderately dry through the spring (Droughtwatch, 2002). During summer of 2002 Rhode Island has experienced increasing levels of drought as water levels have dropped and water use restrictions have been enacted all over the state. The current water plan predicts a rise in water use as the town's population increases; this may lead to greater problems during drought conditions. There have been at least six major droughts in Rhode Island since 1929 including a long-term drought in the mid sixties and a seasonal drought in the summer of 1999 (RI Drought Management Plan).

2.2 Vulnerability Assessment

Economic and Social

North Kingstown's scenic coastline has attracted residential, waterfront commercial, and other development for many years. More recently development has moved towards the western portion of the town as the available land on the coast has become fully developed. The only remaining large tracts of developable land remaining in the coastal area is in the Quonset/Davisville Port and Commerce Park under the control of the Rhode Island Economic Development Corporation. Parts of the industrial park are highly vulnerable to storm surge based on the SLOSH model and storm history in that area.

Coastal buildings are primarily residential with more than 3000 homes and businesses in coastal flood or storm surge areas. The total value of coastal and riverfront residential and commercial buildings is approximately $138,079,100. FEMA indicates a total of 693 properties insured are by NFIP and vulnerable to flooding. There are three repetitive loss properties in North Kingstown, with a total of seven repetitive loss claims among them. All three of these properties are located in Wickford village. Since 1978 there have been 119 flood claims for a total of $170,272.00 (Table 3). Specific vulnerabilities can be found on the risk matrix (Table 4) and on Maps 1 and 2.

Table 3. National Flood Insurance Information for North Kingstown*

Total Flood Insurance Policies	Coverage Total	Polices in 'V' Zones	Policies in 'A' Zones	Number of Claims Since 1978	Number of Repetitive Loss Claims
693	$107,813	15	493	119	7
* As of February, 2002				(Totaling $170,272.00)	

There are several different historical and socially significant structures that are located in evacuation and flood zones. The historic district in Wickford and its harbor are particularly vulnerable to hurricane damage. The existing Harbor Management Plan only deals with the hazards produced by chemical or oil spills though, as previously stated, a storm preparedness plan will be added. The residential, commercial, and industrial areas subject to inundation during a flood or hurricane all pose the threat of introducing hazardous chemicals and wastewater into the environment and therefore represent a possible health risk after the event that can inhibit rescue operations. Large inundation areas can be found along the Hunt and Narrow Rivers, at Pojac Point, Quonset Point, Wickford, and around Bissel Cove. There are two daycare facilities in the evacuation ‘A’ areas, located in Wickford and near Bissel Cove, and there is one daycare center in the ‘B’ evacuation area in Quidnessett. There are two day-care centers that are in close proximity to ‘A’ flood zones. There are no elderly housing or nursing homes located in either a flood zone or an evacuation area. While there are no mobile home parks in the evacuation areas, these locations can still be vulnerable to damage from high winds.

Rhode Island state building codes require that homes be able to withstand a minimum of 90 MPH winds. Since 1997 the schedule D exposure rating has required that structures within 1,500 feet of a water body have special provisions for high wind areas. Flood proofing construction has been required in flood zones since the 1970’s. Any buildings constructed before these codes went into effect are potentially vulnerable to severe storm events.

Since 1977, State building code has required that new buildings and major reconstructions be designed to withstand earthquakes measuring up to 3.0 on the Richter scale. Therefore, Buildings built before 1977 may be vulnerable to earthquakes of that scale. Old masonry buildings and large structures are most vulnerable to earthquake damage. Bridges, dams, and roadways are also susceptible to damage in the event of an earthquake.

Public Infrastructure

The Town owns and operates a large number of facilities in coastal areas subject to flooding and storm surge. Most significant of these are the two town hall buildings; both are located in the hurricane surge area while the Main Town Hall is in an 'X' zone and the Town Hall Annex is in an 'A' zone (Map 2). In the event of a serious storm, sensitive equipment and important documents can both be destroyed leading to a variety of problems in town management including the loss of historic records. In addition, the town emergency operations center and the National Guard Stations at Quonset are within the hurricane evacuation areas designated for the most severe hurricane events (Map 2). Three elementary schools, Wickford, Fishing Cove, and Hamilton, face damage as well in the event of a severe storm (Map 2). The North Kingstown Free Library is another vulnerable town structure subject to storm surge and high winds.

Flooding can expose or otherwise compromise septic systems leading to contamination and public health concerns. The Town maintains two wastewater pumping facilities, one at Wickford Point and the other on Mark Drive, while the RIEDC has a wastewater facility in Quonset Point. All of these wastewater facilities are subject to flooding and storm surge presenting severe water contamination issues. Flooding can also wash out bridges leading to disruption in water provision at the point where it is carried over bridges. The Hussey and Brown Street Bridges in Wickford both carry water lines, as do bridges over Cocumscussoc Brook on Post Road and the Annaquatucket River on Boston Neck Road. The town has several different recreational facilities in coastal areas subject to flooding and storm surge including Allen Harbor Marina, the Town Dock in Wickford, the various buildings at the end of Beach Street, and Wilson Park. Finally, the highway garage on West Main Street is subject to both flooding and storm surge.

Utility lines represent another key vulnerability in the town. High winds and ice/snow storms can bring down phone and electric lines disrupting power and communication to parts of the community and affecting the operations of businesses. The town also has many dams that may be vulnerable to flooding or earthquake damage. An earthquake could also pose a threat to older town buildings such as the Town Hall and Wickford Elementary School.

Natural Resources

The most important natural resource upon which North Kingstown is dependent is its water supply. The town's water comes from three different aquifers, the Hunt, Annaquatucket, and Pettaquamscutt. Current water usage is well below safe yield levels and water is supplied to parts of both Narragansett and Jamestown. Volume II of the North Kingstown Water Supply System Management Plan deals extensively with emergency responses and mitigation actions for droughts, water contamination, supply disruption, and many other situations. Impermeable surfaces above the aquifer can severely restrict the amount of water infiltrating the ground and recharging the aquifer, exacerbating the effects of a drought.

With almost 50 percent of the town being forested, wildfire can be a concern, especially during drought conditions. Large areas of forested lands include the town owned parks,

Cocumscussoc State Park, and private lands, mostly in the western and southern parts of the town.

The town's aquatic environments are significant not only for their high level of quality but also for their high level of in their susceptibility to disruption from natural and manmade events. Flooding may also pose a significant risk to the RI Department of Environmental Management fish hatchery on Hatchery Road. In the event of septic failure due to flooding or storm surge, the resulting discharge could severely impact, and even destroy, important aquatic habitats such as eelgrass beds and shellfisheries. Large-scale coastal storms can also cause serious erosion to town beaches, thereby eliminating important coastal buffers and town recreational areas.

Shelters and Evacuation Routes

The number of people seeking emergency shelter in the event of a natural disaster is difficult to determine; it can be affected by the type and severity of the disaster, amount of forewarning, awareness of shelter locations, and the number of alternative destinations for individual residents. Severe storms with little forewarning can cause the most stress on shelter capacity, as people are more likely to seek shelter when they have less time to make alternative arrangements. Residents of nursing homes and mobile home parks are often the most likely groups to seek public shelter in the event of a natural disaster. Tourists visiting the town may also require shelter access, especially during the summer months that coincide with the hurricane season.

The Red Cross estimates that an average of 10 percent of the town's population will need to utilize public shelters in the event of an emergency situation. With a current population of 26,326 in North Kingstown, that would be approximately 2,632 town residents seeking public shelter. Currently the town has two Red Cross approved shelters, Davisville Middle School, accommodating 401 people and Wickford Middle School, accommodating 344 people. Together these shelters have a capacity of 735. The Red Cross has indicated that they may be considering some regional shelters to bolster town capacities, such as utilizing space at the University of Rhode Island during the summer months.

As with emergency shelter use, it is also difficult to determine how many residents will evacuate coastal areas in the event of a severe storm, except in cases in which evacuation is mandatory. Many people often decide to remain in their homes for the duration of a storm. Evacuation routes for residents leaving the coastal evacuation areas, designated using the SLOSH models, have been created by the North Kingstown Police Department (Map 2). To facilitate evacuation, traffic control points to be manned by police officers during an evacuation have been created at significant road crossings and bridges (Map 2). Evacuating some areas will be of special concern due to limited access, specifically those places with only a single access road that can potentially be blocked by flooding or downed trees. Loop Drive in Wickford, which can only be exited over the Loop Drive Culvert, is one such place where flooding could keep residents from evacuating.

2.3 Coordination With Neighboring Municipalities

North Kingstown borders on six other towns: East Greenwich, Exeter, Jamestown, Narragansett, South Kingstown, and Warwick. Issues concerning hazard mitigation transcend these boundaries requiring that planning for natural hazards coordinate with, and make considerations to, these neighboring municipalities. Water is one of the most important issues concerning North Kingstown and many of its neighbors regarding to both its source and supply. The aquifers from which the town draws its drinking water extend into East Greenwich and Exeter, requiring that mitigation issues concerning drought and water supply contamination be coordinated with these towns. In addition, the Town supplies water to Jamestown and Narragansett such that water use restrictions during a drought must be coordinated with these towns. The North Kingstown Water Supply Management Plan deals with many of these inter municipal issues.

Emergency evacuation is another important issue that in some places requires cooperation with neighboring towns. Residents of both Jamestown and Narragansett will be utilizing North Kingstown evacuation routes in the event of a natural disaster. Jamestown, in particular, could have many residents evacuating through North Kingstown on Route 138. Some North Kingstown residents may evacuate through Warwick and East Greenwich across the Forge Road Bridge or Warwick residents may come through North Kingstown over the same bridge. Evacuation routes and emergency shelters are issues that should be coordinated amongst all seven of these neighboring communities for the safety of all area residents.

Other areas for cooperation between towns have been identified in the actions portion of the plan. Before the plan can be amended into the comprehensive plan copies, will be provided to the neighboring communities for their review and comment.

3.0 – Mitigation Actions

The North Kingstown Hazard Mitigation Committee has created a set of actions in order to address the previously identified risks and vulnerabilities. These actions will serve as an implementation plan as the town attempts to reduce its vulnerability to natural disasters.

3.1 Action Plan

The Risk Assessment Matrix (Table 4) is the base from which the following actions have been developed. The vulnerable areas identified on the matrix were prioritized first by sorting them into groups, with highest priority given to life and property. Further prioritization was based on a variety of considerations including historical damage, number of residents potentially impacted, and the value of property, in economic as well as cultural/environmental terms. The priority assignment given to the items on the matrix plays a role in determining money allocation and the timeframe priority given to specific actions addressing those items.

Mitigation actions are actions that are designed to reduce a town's vulnerability to the effects of natural disasters. Mitigation actions are different from emergency preparedness actions in that emergency actions address a town's response to a hazard event, while mitigation attempts to reduce the amount of damage a natural hazard can possibly cause in the first place. An emergency action in response to flooding would involve decisions about how to build an emergency sandbag levee while a mitigation plan would involve ensuring structures in the flood zone area are flood-proofed or even ensuring that there are no structures in the flood zone area to begin with. Essentially, mitigation is about reducing the dangers, costs, and need for emergency action that is usually associated with natural disaster events.

Each action includes a brief description of what the action will accomplish, who the responsible parties are, how much it will cost, how the action will be financed, and in what time frame the action will be completed. Some actions include reference to an example of how the action has been implemented elsewhere. The actions identified include modifications to the built environment, changes in town policies, distribution of public information on hazard risks, and the creation of community based organizations. In addition, consideration has been made for actions to be taken both before and after a disaster occurs.

The Hazard Mitigation Committee created a set of time frames for the completion of each action: Short term actions will be completed within six months, medium term actions within six to 18 months, and long term actions will be completed within 18 months to five years. In addition, some actions have been identified as ongoing, indicating that such an action requires continual implementation over time.

Life and Property

Vulnerable Area #1: Coastal Neighborhoods

Action #1: Open Space Acquisition

Maintaining and securing land as open space in flood zones and coastal areas is one way to keep the number of people and homes vulnerable to severe storms and flooding from expanding. The town's CRS rating can be improved as more of this vulnerable land is kept from being developed. The Town has been actively acquiring open space to meet a variety of Town goals, one of which is to protect land in flood zone areas.

The Town will continue to take steps to protect land in flood zones and coastal areas. As a priority list of properties targeted for open space protection is developed, hazard mitigation, primarily targeting flood prone areas, will be an important part of the prioritization process. Attention will also be given to providing public coastal access and habitat protection. The North Kingstown Land Conservancy and Narrow River Land Trust could play significant roles in completing this action.

Lead:	Department of Planning and Development
Other responsible parties:	North Kingstown Land Conservancy, Narrow River Land Trust, Town Council, Conservation Commission, and RIDEM
Financing options:	FEMA FMAP grants, Land acquisition bonds (state and municipal), Land Bank, RI DEM, and other open space acquisition funding and strategies.
Cost:	Variable
Timeframe:	Ongoing

Action #2: Volunteer Disaster Assistance Program

Volunteers working at the community level can be tremendous asset to hazard mitigation efforts before, during, and after a natural hazard event. A community member acting as a Volunteer Disaster Assistance officer could coordinate community mitigation activities, act as a local hazard information source, and offer assistance to residents not able to help themselves. In preparation for an impending disaster, volunteers could help residents prepare their homes and facilitate evacuations if necessary. After a disaster, qualified volunteers could provide an initial damage report to town agencies, perhaps help the building department in providing emergency building permits, and aid resident clean-up efforts. These volunteers could be associated with community homeowners associations or neighborhood watch groups.

The Town will provide the framework under which these organizations would be created, limited funding, and a weekend long training session. The training session would include discussion of liability issues, hazard mitigation techniques that homeowners can perform, a description of how the town would operate during and after an emergency, and any other information deemed necessary.

Lead:	Fire and Police Department
Other responsible parties:	Building Official's Office, Community Organizations, Town Solicitor, Public Works Department, and Department of Planning and Development
Financing options:	Town budget, Homeowner's association, FEMA, Red Cross
Cost:	Staff time, Overtime.
Timeframe:	Short Term

Action #3: Building Code Compliance Enforcement

The building inspector will continue to enforce regulations regarding coastal buffers, wind resistance, flood mitigation, and earthquake resistance. Information regarding natural hazard vulnerability will be provided to potential homeowners and considered as building permits are reviewed.

Lead:	Building Official's Office
Other responsible parties:	RI CRMC, Department of Planning and Development
Financing options:	Town budget, CDBG, NFIP ICC
Cost:	Staff time
Timeframe:	Ongoing

Action #4: Hazard Mitigation in Technical Review Committee Meetings

During the course of regular Technical Review Committee meetings consideration will be made of hazard mitigation opportunities when considering applications.

Lead: Department of Planning and Development
Other responsible parties: Other members of the TRC
Financing options: Town budget
Cost: Staff time
Timeframe: Ongoing

Action #5: Information Brochures

Property owners will be informed of their natural hazard vulnerabilities; this information will be passed on to renters as well. In addition, these brochures will encourage residents and businesses in vulnerable areas to form emergency plans and to assess the ability of their structures to withstand flooding, high winds, and earthquakes. Instructions for self-assessment of structure vulnerabilities will be included. Techniques homeowners can utilize on their properties for long-term hazard mitigation and for protection from impending storms will be compiled and distributed to properties located in vulnerable areas. Accompanying these brochures will be a description of town evacuation routes and shelters. The brochures will also be distributed to area builders and contractors. A GIS system will allow the quick and accurate production of maps showing hazard areas that can be given to property owners. Such maps could be easily updated for changing environmental conditions.

Lead: Department of Planning and Development
Other responsible parties: Police Department, North Kingstown Chamber of Commerce, CRMC, Institute for Business and Home Safety, RI Red Cross, Building Official's Office
Financing options: CDBG, NFIP ICC, NESEC
Cost: Staff time
Timeframe: Short Term

Action #6: Evacuation of Tourists

The police department will distribute information on town evacuation routes and emergency shelters to hotels, bed and breakfasts, and any other facilities hosting tourists and out of town visitors in flood zones and hurricane evacuation areas. The information is then made available to visitors in the event of a natural hazard or other emergency.

Lead: Police Department
Other responsible parties: Department of Planning and Development, Chamber of Commerce
Financing options: Town budget
Cost: Variable
Timeframe: Short

Action #7: Reduce and Manage Storm Water

Impermeable surfaces such as asphalt and concrete reduce the amount of water passing into the soil and increase the amount of run-off' this leads to higher levels of flooding and erosion. The Town will encourage the use of permeable paving materials and other creative means for controlling storm water by residential, commercial, and industrial landowners. A packet will be developed containing a selection of best management practices for storm water management. The Town is in the process of developing a storm water management plan. As this plan is developed, priority will be given to those storm water management improvements that coincide with evacuation routes and roads that offer a single point of access to flood vulnerable neighborhoods.

Lead:	Department of Public Works
Other responsible parties:	Department of Planning and Development, Engineering Department, Landowners
Financing options:	Town budget
Cost:	Staff time
Timeframe:	Medium Term

Action #8: GIS Acquisition and Development

A Geographic Information System (GIS) would allow the town a number of opportunities for map analysis purposes. A much more precise analysis of town risks and vulnerabilities could be done with GIS, including additional information on the number of people and property values at risk. Informative and easily updated maps could be provided to town residents regarding hazard zones. Finally, GIS could be a great asset in implementing the actions identified in this plan; it would allow easy identification of what properties and buildings need what level of action relative to a given natural hazard.

Lead:	Town Information Systems Department
Other responsible parties:	Department of Planning and Development
Financing options:	Town budget, user fees, and grants.
Cost:	$64,800 for software and initial consultant services.
Timeframe:	Medium Term

Action #9: Post-Disaster Hazard Mitigation Opportunities

Develop a list of properties in flood prone areas, especially coastal 'V' zones, for potential acquisition after a severe storm event in which the structure has been seriously damaged or destroyed. Repetitive loss properties should be prioritized on this list. NFIP requires that if a property is damaged or renovated totaling more than 50 percent of the property's market value it must be rebuilt to meet flood zone regulations. Coastal properties in the same situation would also have to meet CRMC requirements.

Lead:	Building Official's Office
Other responsible parties:	Department of Public Works, State floodplain manager and building code commissioner, CRMC
Financing options:	FEMA, RIEMA
Cost:	Variable
Timeframe:	Medium Term

Action #10: Encourage ISDS Upgrades

Upgrading coastal individual sewage disposal systems (ISDS) systems would benefit the long-term protection of Narragansett Bay from nitrate leaching as well as mitigate the amount of pollutants introduced into the bay if the system is exposed during a storm event. Education efforts are underway to encourage homeowners in the Wickford Harbor watershed to maintain and upgrade their systems. Property owners in the flood plain who install advanced treatment systems should consider incorporating anti-floatation measures. The resulting brochure could be used wholly or in part to educate other coastal property owners. Upgraded systems should include an emergency shut-off feature with instructions on how and when to use it.

Lead:	Department of Planning and Development
Other responsible parties:	RIDEM, RI Cooperative Extension
Financing options:	CDBG, RI Cooperative Extension
Cost:	Staff time
Timeframe:	Ongoing

Vulnerable Area #2: Wickford Village

Action #11: Retrofitting Historic Homes

The Building Official's Office will research retrofitting techniques that mitigate flood and wind damage while maintaining the historic integrity of the home. The Historic District Commission may make reasonable allowances for changes that may alter appearance but ultimately will protect the home and its residents. Historic homeowners should be instructed in self-inspection to determine how vulnerable their structures are to storm damage.

Lead: Building Official's Office.
Other responsible parties: Historic District Commission, Historic Wickford, Department of Planning and Development
Financing options: Town budget, Private Grants for Historic Preservation
Cost: Staff time
Timeframe: Medium

Action #12: Business Continuation

The Chamber of Commerce will develop strategies to help local businesses in flood prone and coastal areas recover from the effects of a natural disaster. These strategies will include organizing business owners for collective clean-up of their properties after a disaster and the creation of a list of businesses and the people connected with those businesses who are authorized to enter the business in the period of time immediately after a disaster. This list would be for the use of the police department in their role of guarding properties after a disaster. The police department will develop criteria for determining when safety considerations outweigh the right of a given business owner to access their property.

Lead: North Kingstown Chamber of Commerce
Other responsible parties: Police Department, RIEDC, Wickford Village Association, Building Official's Office
Financing options: Town budget, NK Chamber of Commerce
Cost: Staff time
Timeframe: Medium Term

Vulnerable Area #3: Elderly Housing

Action #13: Protecting Coastal Facilities

The Scalabrini Villa Nursing Home is the only elderly housing facility in North Kingstown vulnerable to the effects of a severe storm. The facility is located in a SLOSH evacuation area indicating that it is susceptible to damage from the storm surge and wind associated with a hurricane. The building official will notify the facility of its vulnerability and an evacuation plan will be developed by the facility with the support of the police department. In the event of destruction, or damage equaling more than 50 percent of the structure, consideration should be given to moving the facility to a new location.

Lead: Building Official's Office
Other responsible parties: Police Department
Financing options: Town budget, Scalabrini Villa Nursing Home
Cost: Staff time
Timeframe: Short Term

Action #14: Ensuring the Safety of Elderly Housing and Nursing Homes

Natural Hazards occurring on a town-wide basis are a threat to all elderly housing and nursing home facilities in the town. The building official will provide assistance towards self-assessment of these structures as to their vulnerability to flood, high winds, earthquake, extreme winter weather, and power loss. Retrofitting will be conducted as necessary.

Lead: Building Official's Office
Other responsible parties: Senior Services
Financing options: Town budget
Cost: Staff time
Timeframe: Medium Term

Action #15: Elderly and Handicapped Residents

The police and fire departments will maintain their list of elderly and handicapped residents living independently in the Town. The list will be divided by evacuation area and susceptibility to flooding or storm surge.

Lead: Police and Fire Departments
Other responsible parties: Senior Services Department, GIS
Financing Options: Town budget
Cost: Staff Time
Timeframe: Ongoing

Vulnerable Area #4: Wickford Village Housing

Action #16: Protecting Wickford Village Housing From Flooding and Storm Surge

The Wickford Village Housing complex is in the Five Hundred Year Flood Zone and the SLOSH (B) evacuation area. The planning department will inform the facility of its vulnerabilities and provide assistance towards self-assessment of the building as to its structural vulnerability to flood, high winds, earthquake, extreme winter weather, and power loss. Retrofitting will be conducted as necessary. The building's wastewater system is connected to the town police station as well. In addition, an evacuation plan coordinated with the town plans should be developed by the facility for senior and disabled residents.

Lead: Department of Planning and Development
Other responsible parties: Police Department, Building Official's Office, Senior Services
Financing options: Town budget
Cost: Staff time
Timeframe:

Vulnerable Area #5: Masonry Apartments and Mill Buildings

Action #17: Earthquake Mitigation

There are many apartment and mill buildings in the town built before the 1977 state building codes regarding earthquake resistance were adopted. The building official's office will provide assistance to property owners conducting self-evaluations of their property's structural vulnerability to earthquakes. A collection of retrofit techniques will be compiled and made available to property owners.

Lead: Building Official's Office
Financing options: Town budget
Cost: Staff time
Timeframe: Ongoing

Vulnerable Area #6: Mobile Home Parks

Action #18: Protecting Mobile Home Parks From High Winds

Mobile homes are traditionally identified as the type of housing most vulnerable to severe weather. None of the mobile home parks in North Kingstown are located in flood zones or coastal areas, but high winds from either a hurricane or tornado could cause serious damage. Park owners will be encouraged to provide information to their residents on what they can do to protect their property and where they need to go if a severe storm is approaching.

Lead: Building Official's Office
Financing options: Town budget, Red Cross
Cost: Staff time
Timeframe: Ongoing

Child Safety

Vulnerable #1: Town Schools

Action #19: Protecting Schools in the Flood Zone

There are four elementary schools located in a flood zone (A), Wickford, Fishing Cove, Forest Park, and Hamilton. Three of those schools are coastal and therefore susceptible to storm surge as well. The schools will be inspected to determine their vulnerability to damage and steps will be taken to make these schools more flood and storm resistant. Important school records should be stored in a manner to protect them from flood damage.

Lead: School Department
Other responsible parties: Building Official's Office Town Information Systems Department
Financing Options: Town budget, FEMA
Cost: Staff time, Variable depending on renovations needed
Timeframe: Medium Term

Action #20: Safety Procedures for School Children

Evacuation procedures will be developed for the town's schools. Children will be transported by bus to the nearest public shelter if necessary. The school department will coordinate with the Jamestown school department for emergency procedures for the high school students from that town. A notification plan will be in place for notifying the children's parents in the event of an evacuation. These planning steps are most important for the four schools in flood zones. The school department will acquire early warning weather radios from New England States Emergency Consortium (NESEC).

Lead:	Police Department
Other responsible parties:	School Department, RI Red Cross, Jamestown School Department
Financing options:	Town budget, NESEC
Cost:	Staff time
Timeframe:	Ongoing

Action #21: Earthquake Preparation

The schools will be inspected to determine their vulnerability to earthquakes. As necessary, the buildings will be retrofitted for earthquake resistance.

Lead:	Building Official's Office
Other responsible parties:	School Department
Financing options:	Town budget, FEMA, RIEMA
Cost:	Staff time, Variable, depending on needed renovations
Timeframe:	Medium Term

Action #22: Post-Disaster Relocation

In the event of one of the schools in the flood zone being destroyed or severely damaged such that repair would cost at least 50 percent of the value of the property, consideration will be made of moving the school's location to an area outside the flood zone. If the school is not moved, than it will be rebuilt according to FEMA standards for structures in flood zones.

Lead:	School Department
Other responsible parties:	Department of Planning and Development, Planning Commission, Town Council, Building Official's Office
Financing options:	FEMA, RIEMA
Cost:	Variable
Timeframe:	Long Term

Vulnerable Area #2: Day-Care Centers

Action #23: Protecting Day-Care Centers in the Flood Zone

There are two day-care centers in North Kingstown located in areas prone to flooding and storm surge, North Kingstown Daycare on Boston Neck Road and St. Paul's Nursery on Main Street. In addition, the Little Miracles Day-Care center is located in a SLOSH area on the Scalabrini Villa property. The building official will inform these facilities of their vulnerabilities and provide them with information on steps they can take to reduce their structural vulnerability to flooding and storm surge. In addition, post disaster relocation will be considered. Each facility will be responsible for developing an evacuation plan, with the assistance of the police department and coordinated with the town-wide plan for schoolchildren.

Lead:	Multi Department
Other responsible parties:	Police Department, Department of Planning and Development, Day-Care Centers, Building Official's Office
Financing options:	Town Budget
Cost:	Staff time
Timeframe:	Short Term

Emergency Services

Vulnerable Area #1: Evacuation Routes

Action #24: Evacuation Route Markers

The Town will cooperate with Rhode Island Department of Transportation in placing signs at significant egress points to aid residents in the event of an evacuation. Though evacuation is generally not mandatory, early evacuation of certain neighborhoods with limited access, or in vulnerable coastal areas, will be considered. Placards will be placed on the emergency shelters identifying them as such.

Lead:	Police Department
Other responsible parties:	Fire Department, RIDOT, School Department, Town Highway Department, Department of Public Works
Financing options:	Town budget, RIEMA
Cost:	Staff Time
Timeframe:	Medium Term

Action #25: Maintain Viable Evacuation Routes

As a part of the town's tree maintenance plan, priority will be placed on trimming and maintaining the health of trees identified as running along evacuation routes and roads offering a single point of access to coastal and flood prone neighborhoods; one example are the trees along the road entering the Mount View neighborhood.

Lead: Department of Public Works
Other responsible parties: Police Department, Town Tree Warden
Financing options: Town budget
Cost: Staff Time
Timeframe: Short Term and Ongoing

Action #26: Publish Evacuation Routes

The Planning Department will contact the Verizon Phone Company in regards to putting the North Kingstown Evacuation Routes Maps, including emergency shelter locations, in the Community Section of the local phone book.

Lead: Department of Planning and Development
Other responsible parties: Police Department, Verizon Phone Company
Financing Options: Town Budget
Cost: Staff Time
Timeframe: Short Term

Action #27: Coordinate Evacuation Plans With Neighboring Towns

The police department will work with neighboring towns to coordinate evacuation plans. Jamestown, Narragansett, and possibly some Warwick residents would potentially evacuate during a severe storm event through or into North Kingstown. To ensure the safe and timely evacuation of all coastal residents these towns should ensure that their individual evacuation plans are compatible.

Lead: Police Department
Other responsible parties: Fire Department
Financing options: Town budget
Cost: Staff time
Timeframe: Short Term

Vulnerable Area #2: Emergency Shelters

Action #28: Additional Emergency Shelters

By Red Cross estimations, shelter capacity in North Kingstown needs to accommodate 1,897 more people than it currently does. The Town will work with the Rhode Island Chapter of the American Red Cross to designate more shelters in the town and on a regional basis, to accommodate all town residents who might be seeking shelter in the event of a natural disaster. The Town will continue to maintain the current shelters based on the standard requirements for emergency shelters as determined by the Red Cross. As the town population increases in the future, the Town will ensure that adequate emergency shelter capacity exists.

Lead: RI Chapter of the American Red Cross
Other responsible parties: Police Department, Fire Department, School Department
Financing options: Town budget, Red Cross
Cost: Staff time
Timeframe: Short Term

Vulnerable Area #3: Town Emergency Operations Center

Action #29: Ensure Operation Ability of the Town Emergency Operations Center

The Emergency Operations Center is located in a SLOSH (B) area indicating that it may be susceptible to damage during a category 3 or stronger hurricane. The police and fire departments will take steps to ensure that the operational ability of the center will not be impaired during such a storm event. One critical role this facility plays is as a communication center. The Town will look at the feasibility of a disaster emergency help line based at this center that town residents can call for information and help in preparing their homes for an approaching storm.

Lead: Police Department
Other responsible parties: Fire Department, Department of Public Works
Financing options: Town budget
Cost: Staff time
Timeframe: Ongoing

Vulnerable Area #3: Rhode Island Air and Army National Guard

Action #30: Ensure Operation Ability of the National Guard Base

The Air and Army National Guard Units stationed at Quonset Point would be an important asset to the town and state in the event of a natural hazard event. The base is located in a flood zone (A) and in a SLOSH (B) area. To ensure that National Guard units will be able to respond during a natural hazard, steps will be taken to protect the base structures and equipment. Structures will be inspected for their flood and earthquake vulnerability and structural renovations will be made as necessary. Procedures for shifting the operational base during a severe storm if necessary will be developed.

Lead: RI Air and Army National Guard Units
Other responsible parties: Building Official's Office
Financing options: RIAC Budget
Cost: Staff time
Timeframe: Medium term

UTILITIES AND INFRASTRUCTURE

Vulnerable Area #1: Dams

Action #31: Dam Inspection and Classification

All dams will be inspected to determine their vulnerability to failure during a flood. Each dam will be classified by town or private ownership and by the level of risk associated with dam failure. As dams in need of repair, replacement, or removal are identified, these actions will be carried out by the town for town-owned dams. A plan for remediation of privately owned dams should be developed by the state. A schedule for dam inspection will be set so that there will be continued monitoring of the dams in town.

Lead: Public Works Department
Other responsible parties: RIDEM
Financing options: Town Budget, FEMA, RIEMA, RIDEM, FMA ICC
Cost: Staff Time, Retrofits dependent on design and engineering
Timeframe: Ongoing for Publicly Owned Dams, Short term for Privately owned dams

Vulnerable Areas #2 and 3: Town Bridges

Action #32: Bridge Inspection

All town bridges will be inspected for structural integrity to determine their individual vulnerability to damage in the event of flood or earthquake. Bridges will be retrofitted as needed. A schedule of inspection will be developed to ensure that all bridges are maintained at a high level of safety.

Lead: RIDOT
Other responsible parties: Department of Public Works
Financing options: Local and State funds, FEMA
Cost: Staff Time, Retrofits dependent on design and engineering
Timeframe: Ongoing

Action #33: Emergency Procedure for Gas Lines Running on Bridges

Work with New England Gas to create a plan for timely shut down of gas lines in the event of bridge collapse and line disruption. The bridges carrying gas lines are the Hussey Bridge, the Brown Street bridge, the Babbit Farm bridge over Cocumscussoc Brook and the Hamilton Mill bridge on Boston Neck Road.

Lead: New England Gas
Other responsible parties: Department of Public Works, RIDOT, North Kingstown Hazard Mitigation Committee
Financing options: New England Gas
Cost: Staff Time
Timeframe: Short Term

Action #34: Emergency Procedure for Water Lines Running on Bridges

The North Kingstown Water Department already has emergency plans in place to respond to broken water lines. These plans deal with shutting down the water and protecting the water from contamination. The Water Department will review these plans and determine if they adequately cover the possibility of a bridge being washed out by flooding and the possibility of water supply contamination that could result from floodwaters entering the system. Isolation block valves will be identified on either side of these bridges in order to separate a breached area from the rest of the water system. In addition, the water department will analyze the water service maps in order to ensure that water can be adequately supplied to all customers even after a bridge has been washed out. The bridges that carry water lines are the Hussey bridge, the Brown Street bridge, the Babbit Farm bridge over Cocumscussoc Brook, the Hamilton Mill bridge on Boston Neck Road, the Stony Lane and Drybridge Road bridges over the railroad tracks, and the Forge Road bridge over the Potowomut River.

Lead: Water Department
Other responsible parties: RIDOT
Financing options: Town budget
Cost: Staff time
Timeframe: Ongoing

Vulnerable Area #4: Wells

Action #35: Protect Town Wells From Flood Waters

Wells number 9 and 10 are located in Flood A areas. In the past, well #10 has experienced bacterial contamination that may have been the result of floodwaters. The water department will identify methods by which to flood proof town wells.

Lead: Water Department
Financing options: FEMA, RIEMA
Cost: Staff Time
Timeframe: Ongoing

Action #36: Private Well Protection

Loss of electrical utility service can lead to a loss of access to private wells as electric pumps are no longer able to function. The water department will develop a list of properties with private wells, highlighting those properties that are not connected to the municipal water system. Those property owners not connected to the municipal water system will be informed of the risk they face in the event of electrical utility loss and the cost and availability of connecting to the municipal water system where possible. The benefits and costs of purchasing an individual generator versus maintaining the existing conditions will be outlined as well.

Lead:	Water Department
Other responsible parties:	Department of Planning and Development
Financing Options:	Town Budget
Cost:	Staff Time
Timeframe:	Medium Term

Action #37: Protect the Town Water Supply From Contamination and Drought

The water department has developed extensive plans for dealing with emergencies and protecting the water supply from contamination. One important part of these plans is protecting undeveloped land over the town's aquifers. By protecting this land, the water supply is protected from contamination and the recharge ability of the aquifer is maintained, increasing its ability to resist the effects of a drought. The Town will continue to preserve land and limit development around the wells and over the aquifers**.** In addition, the Town will work with East Greenwich, Exeter, and Warwick to coordinate land protection over the portions of the aquifers that are in those towns and to protect land around the wells in East Greenwich.

Lead:	Department of Planning and Development
Other responsible parties:	Water Department, Towns of East Greenwich, Exeter, and Warwick
Financing options:	FEMA grants, Land acquisition bonds (state and municipal), Land Bank, RI DEM, and other open space acquisition funding and strategies.
Cost:	Variable
Timeframe:	Ongoing

Vulnerable #5: Electric Utility Lines and Facilities

Action #38: Tree Trimming

The Town and the Narragansett Electric Company will continue to maintain street trees and other trees close to utility lines in a manner that will protect those lines in the event of a storm. This action will serve the additional benefit of reducing the amount of debris generated during the storm thereby reducing clean-up costs. The town Tree Inventory Management Plan calls for the removal of many different trees across town. Those trees from this list that pose a threat to utility service or other property in the event of a natural hazard will be prioritized for removal.

Lead: Department of Public Works
Other responsible parties: Narragansett Electric Co., Town Tree Warden
Financing options: Town budget, RIEMA, Utility companies
Cost: Staff time - variable based on cost of tree removal
Timeframe: Ongoing

Action #39: Underground Utility Lines

As the opportunity arises, the town will move utility lines underground, with first priority on lines in coastal areas.

Lead: Department of Planning and Development
Financing options: Transportation Improvement Program Grants, FEMA, RIEMA, Special Tax Areas
Cost: Variable, dependent on design and area.
Timeframe: Long Term

Vulnerable Area #6: RIEDC Wastewater Treatment Facility

Action #40: Investigate Vulnerability and Retrofit as Necessary

The RIEDC wastewater treatment facility is in a 'V' flood zone indicating that it is susceptible to breaking wave action during a serious storm. In addition it is in a SLOSH 'A' area such that any hurricane will potentially impact the facility. The Town will work with the RIEDC to ensure that the facility is inspected for its ability to withstand these impacts and retrofitted as necessary. If the facility is determined to be vulnerable to damage a plan for protecting the facility, perhaps using a portable dike and pumping equipment, will be developed by the RIEDC in conjunction with the Town.

Lead: RIEDC
Other responsible parties: RIDEM
Financing options: RIEMA, RIEDC, FMAP
Cost: Staff time
Timeframe: Medium term

Action #41: Relocation

If the wastewater facility is severely damaged or destroyed in a storm event, a new, less vulnerable, location will be considered.

Lead: RIEDC
Other responsible parties: Department of Planning and Development
Financing options: RIEMA, RIEDC, FMAP
Cost: Staff time
Timeframe: Medium term

Vulnerable Area #7: Town Wastewater Pumping Facilities

Action #42: Shutting Off Service

During a flood or severe storm event, the town engineer and/or water department should consider shutting down the wastewater pumping facilities at Wickford Point and Mark Drive.

Lead: Engineering Department
Other responsible parties: Water Department
Financing options: Town budget and FEMA Flood Mitigation Assistance Program
Cost: Staff time
Timeframe: Short Term

Action #43: Flood-proofing

The pumping facilities will be flood proofed, with priority placed on the Wickford Point facility, due to its greater vulnerability.

Lead: Water Department
Financing options: Town budget and FEMA Flood Mitigation Assistance Program
Cost: Dependent of design and engineering
Timeframe: Medium Term

Action #44: Emergency Pumping

A plan for pumping wastewater into a temporary or portable container in the event of flooding will be developed exclusively for town-owned facilities

Lead: Department of Public Works
Other responsible parties: Water Department
Financing Options: Town Budget
Cost: Staff Time
Timeframe: Long-term
Model: Narragansett

Vulnerable Area #8: Phone Lines and Cell Towers

Action #45: Protecting Land Line Phone Service

The Town and the Narragansett Electric Company will continue to maintain street trees and other trees close to utility lines in a manner that will protect those lines in the event of a storm. This action will serve the additional benefit of reducing the amount of debris generated during the storm thereby reducing clean-up costs. The town Tree Inventory Management Plan calls for the removal of many different trees across town. Those trees from this list that pose a threat to utility service or other property in the event of a natural hazard will be prioritized for removal. If electric lines are put underground, than the phone lines should be considered for this treatment as well.

Lead: Department of Public Works
Other responsible parties: Phone Company, Town Tree Warden, Narragansett Electric Co.
Financing options: RIEMA, TIP, Phone company
Cost: Staff Time
Timeframe: Ongoing

Vulnerable Area #9: Wickford Service Stations

Action #46: Contain Hazardous Materials

Property owner will be contacted and these businesses will be requested to develop plans that ensure the containment of hazardous materials in the event of a severe storm or hurricane. Special attention will be paid to underground storage tanks that could float or rupture in the event of flooding.

Lead: Building Official's Office
Financing options: Town Budget, the Service stations
Cost: Staff Time
Timeframe: Long Term

Action #47: Investigate Vulnerability and Retrofit

The property owners will be given information on how to assess the structural integrity of the two service stations in terms of resistance to flood and winds.

Lead: Building Official's Office
Financing options: Town Budget
Cost: Staff Time
Timeframe: Long Term

MUNICIPAL FACILITIES

Vulnerable Area #1: Town Hall

Action #48: Investigate Vulnerability and Retrofit

The Town Hall is located in the 500-year flood zone and in a SLOSH 'A' area. The building will be inspected to determine its need for flood proofing and earthquake retrofit. Renovations will be made as necessary. Records will be stored in such a way that they are protected from flooding in the building.

Lead: Department of Public Works
Other responsible parties: Town Information Systems Department, Building Official's Office
Financing options: FEMA, RIEMA, Town Budget
Cost: Staff Time, variable depending on renovations needed.
Timeframe: Investigation – Short Term
Remediation – Long Term

Action #49: Post-Disaster Relocation

If the Town Hall is subject to serious damage or destruction a new location will be found for rebuilding.

Lead: Town Manager
Other responsible parties: Building Official's Office, Department of Planning and Development
Financing options: FEMA Post-Disaster Recovery Assistance
Cost: variable, in millions.
Timeframe: Long Term – Post Disaster

Vulnerable Area #2: Town Hall Annex

Action #50: Investigate Vulnerability and Retrofit

The Town Hall Annex is located in an 'A' flood zone and in a hurricane surge area that has experienced repeated flooding during past storms. The town will take steps to protect the records and documents currently stored in the basement of that building. Past flooding has damaged some of those records. The annex building will also be inspected and opportunities for flood, wind, and earthquake proofing identified. Retrofitting will be done as necessary with attention to maintaining the building's historical character.

Lead:	Building Official
Other responsible parties:	Town Information Systems Department, Department of Public Works
Financing options:	FEMA, RIEMA, Town Budget
Cost:	Staff Time, variable depending on renovations needed.
Timeframe:	Investigation – Short Term Remediation – Long Term

Action #51: Post-Disaster Relocation

If the Town Hall Annex is seriously damaged or destroyed then a new location will be found for the departments located in this building. In the event of the destruction of the main Town Hall consideration should be made for rebuilding the Town Hall building to accommodate all town departments.

Lead:	Town Manager
Other responsible parties:	Building Official, Department of Planning and Development
Financing options:	FEMA Post Disaster Recovery Assistance
Cost:	variable, in millions
Timeframe:	Long Term – Post Disaster

Vulnerable Area #3: Senior Center, Cold Spring Community Center, and the Art Association Building

Action #52: Investigate Vulnerability and Retrofit

The Beach Street facilities are in a Flood 'A' zone and a hurricane surge area. All three buildings will be investigated for their structural vulnerabilities and retrofitted as needed. Attention will be given towards maintaining their historical character. In the event of destruction, the town will consider rebuilding these structures in another location.

Lead:	Building Official's Office
Other responsible parties:	Senior Center Director, Recreation Director
Financing options:	FEMA, RIEMA, Town Budget
Cost:	Staff Time, variable depending on renovations needed.
Timeframe:	Investigation – Short Term Remediation – Long Term

Vulnerable Area #4: North Kingstown Free Library

Action #53: Investigate Vulnerability and Retrofit

The library is located in the storm surge area. The Town will ensure that the library building will be able to resist the high winds and flooding associated with a severe storm or hurricane. The trees surrounding the building, with special attention to those on the waterside, will be well maintained with the removal of dead limbs and trees to prevent their being blown into the building during a storm. Trees removed will be replaced such that a natural wind-block is maintained.

Lead:	Building Official's Office
Other responsible parties:	Library Director, Tree Warden
Financing options:	FEMA, RIEMA, Town Budget
Cost:	Staff time, variable depending on renovations needed.
Timeframe:	Investigation – Short Term Remediation – Long Term

Action #54: Protect Library Resources

A plan for protecting the library's resources, with priority on those that are irreplaceable, will be developed. Consideration will be given for evacuating some of the more important resources to a safe location.

Lead:	Library Director
Financing options:	Town Budget, private library related grants
Cost:	Staff Time
Timeframe:	Medium Term

Vulnerable Area #5: West Main Street Highway Garage

Action #55: Contain Hazardous Materials

All hazardous materials, including fuel and other automotive fluids, will be stored in such a manner that they will not be spilled or leak in the event of flooding.

Lead: Department of Public Works
Financing options: Town Budget
Cost: Staff Time
Timeframe: Long Term

Action #56: Investigate Vulnerability and Retrofit

The garage's specific structural vulnerability will be assessed in terms of flood and winds. Steps will be taken to retrofit the structure as needed. Relocation of the garage will be considered in the event of its destruction or severe damage.

Lead: Department of Public Works
Financing options: Town Budget, FEMA, RIEMA, FMA ICC
Cost: Staff Time, variable depending on renovations needed.
Timeframe: Long Term

Quonset Point

Vulnerable Area #1: Existing and Proposed Development at Quonset Point

Action #57: New Development

Quonset Point is an area that has in the past been hard hit by hurricanes and severe storms. All new development will be required to meet at least the current flood, wind, and earthquake resistance building codes, however for additional protection, businesses will be encouraged to go beyond what is required. The RIEDC will develop a list of further structural changes that could be incorporated into these buildings including building orientation related to primary wind direction. Where possible, impermeable surfaces will be kept to a minimum.

Lead: State Building Code Commissioner
Other responsible parties: RIEDC, CRMC
Financing options: RIEDC, developers
Cost: Staff Time
Timeframe: Ongoing

Action #58: Current and New Development

A large percentage of the Quonset Point coastal area is in fact filled land put in by the Navy in 1940 when the base was built. The RIEDC will determine the extent of that fill and its stability in the event of an earthquake. Measures to protect structures and utilities from earthquake damage will be implemented as necessary.

Lead: RIEDC, State Building Code Commissioner
Other responsible parties: Building Official, CRMC
Financing options: RIEDC, Private businesses, developers
Cost: Staff Time, variable depending on renovations needed.
Timeframe: Ongoing

Action #59: Outreach

Current businesses in the flood and surge areas of Quonset Point will be informed of their location relative to natural hazards, primarily hurricanes, and given information on how they can protect their property.

Lead: RIEDC
Financing options: RIEDC
Cost: Staff time
Timeframe: Ongoing

Action #60: Hazardous Material Containment

Businesses operating with hazardous materials will be identified. These businesses will be requested to develop plans that ensure the containment of those materials in the event of a severe storm or hurricane.

Lead: Fire Marshall (State and Local)
Other responsible parties: RIEDC, ARCH CAP
Financing options: RIEDC, Private businesses
Cost: Staff Time
Timeframe: Ongoing

Action #61: Business Continuation

The Chamber of Commerce will develop strategies to help businesses located in Quonset in flood prone and coastal areas recover from the effects of a natural disaster. These strategies will include organizing business owners for collective clean-up of their properties after a disaster and the creation of a list of businesses and the people connected with those businesses who are authorized to enter the business in the period of time immediately after a disaster. This list would be for the use of the police department in their role of guarding properties after a disaster. The police department will develop criteria for determining when safety considerations outweigh the right of a given business owner to access their property.

Lead:	North Kingstown Chamber of Commerce
Other responsible parties:	Police Department, RIEDC, Building Official's Office
Financing options:	NK Chamber of Commerce, RIEDC
Cost:	Staff time
Timeframe:	Medium Term

Vulnerable Area #2: Quonset State Airport

Action #62: Investigate Vulnerability and Retrofit

The airport is located in a coastal flood zone and in a storm surge area. The Rhode Island Airport Corporation will be asked to assess the airport's structural vulnerability to flood, wind, and earthquake and retrofit as necessary. The Town will also request that a plan for securing hazardous materials such that they are not vulnerable to flooding be created.

Lead:	Rhode Island Airport Corporation
Financing options:	RIAC
Cost:	Staff Time
Timeframe:	Medium term

CULTURAL AND RECREATIONAL RESOURCES

Vulnerable #1: Town Harbors and Moorings

Action #63: Storm Preparedness Plan

The Harbor Management Commission will prepare a storm preparedness plan. The plan will address mitigating the effects of severe storms on boats, marina infrastructure, and docks. Attention will be paid to the fact that there are many residential and commercial properties surrounding Wickford Harbor that could be damaged by boats and debris from the harbor carried by storm winds and waves. Attempts will be made to mitigate the damage that storm-carried debris can cause.

Lead:	Harbor Management Commission
Other responsible parties:	Harbor Division, Department of Planning and Development, Individual Marina Owners
Financing Options:	Town budget
Cost:	Staff time
Timeframe:	Medium Term

Action #64: Wickford Harbor Breakwater

The Town will analyze the feasibility of replacing or enlarging the breakwater at the entrance to Wickford harbor. This analysis will include considerations of environmental impacts, including tidal exchange and aquatic life habitat, as well as a cost/benefit assessment. One of the concerns with increasing the size of the breakwater has to do with the ability of the harbor to cleanse itself through tidal exchange; the harbor is already under a great deal of pressure from pollution. In addition, the channel is federally maintained so that all proposed changes would require approval from the Army Corp of Engineers.

Lead:	Planning Department
Other responsible parties:	Harbor Division
Financing options:	Army Corp of Engineers, FEMA
Cost:	Subject to design and engineering.
Timeframe:	Long Term

Vulnerable Area #2: Gilbert Stuart Birthplace and Smith's Castle

Action # 65: Retrofitting the Buildings

The Building Inspector's Office, in cooperation with the Gilbert Stuart Birthplace and Smith's Castle, will research retrofitting techniques that mitigate flood damage while maintaining the historic integrity of the home. These techniques will be used as necessary. The museum will develop a plan for removing or otherwise protecting valuable exhibit pieces when there is a threat of flooding.

Lead:	Gilbert Stuart Birthplace, Smith's Castle
Other responsible parties:	Building Official's Office, RIHPHC, Department of Planning and Development
Financing options:	RIEMA, FMA ICC, Gilbert Stuart Birthplace, Smith's Castle
Cost:	Staff time, variable depending on design and engineering.
Timeframe:	Short

Vulnerable Area #3: Town Beaches

Action #66: Beach Maintenance

Beaches can play an important role in preventing erosion and protecting coastal properties. The Town will work with the CRMC to research the possibility of and necessity of beach renourishment and even establishment of new beaches in various locations including Wickford Harbor, Quonset Point, and the Town Beach. If possible sand washed onto roads from beaches during a storm will be returned to those beaches; otherwise, a specific location will be determined where the sand can be temporarily stored until a permanent location can be found. Dredged sand may also be used for beach renourishment, with CRMC approval.

Lead:	CRMC
Other responsible parties:	Department of Planning and Development, Department of Public Works, Department of Liesure Activities
Financing options:	RIDEM, CRMC
Cost:	Variable with amount of sand displaced
Timeframe:	Long Term

Vulnerable Area #4: Ryan Park, Chafee Nature Preserve (Rome Point), Wilson Park, Cocumscussoc State Park, Calf Pasture Point

Action #67: Fire Protection

During periods of dry weather and drought, the fire department will monitor large forested areas in an attempt to catch a fire before it is able to grow and cause significant damage. The water department already runs a similar patrol during drought conditions in the western part of the town over the aquifer. The fire department will also ensure that there is adequate access to forested parcels and a local source of water. Quantities of underbrush and dead limbs can allow a fire to quickly become very large and burn out of control. The fire department will assess the level of underbrush in these parks and determine if a controlled burn or other means of removal is necessary.

Lead:	Fire Department
Other responsible parties:	Water Department
Financing options:	Town budget, RIDEM
Cost:	Staff time
Timeframe:	Medium term

Vulnerable Area #5: Municipal Golf Course

Action #68: Investigate Vulnerability and Retrofit

The North Kingstown Municipal Golf Course is located in a flood zone and a storm surge area. Golf Course facilities will be inspected for their structural vulnerability to flood, wind, and earthquake and retrofits will be made as necessary. Plans for the secure storage of hazardous materials will be made. Loss of revenue from lost playing time due to a natural disaster would cause problems and a loss of revenues for many of the Town's recreation activities.

Lead:	Building Official's Office
Other responsible parties:	Leisure Activities Director
Financing options:	Town Budget
Cost:	Staff Time
Timeframe:	Investigation – Short Term Remediation – Long Term

POST DISASTER PLANS

Action #69: Debris Management Plan

The Town will develop a plan for collecting and disposing of debris after a storm event. Locations where debris can be collected will be determined, with different locations for potentially hazardous debris, such as propane tanks, made separate. A list of hazardous material handlers regulated by the EPA can be found at http://www.epa.gov/enviro/html/em/index.html. As hazardous waste handlers and treatment facilities will be in high demand during a natural hazard event, the Town should actively seek an agreement with one or more such vendors in order to ensure a timely response at a reasonable price. Even with this precaution, the site for hazardous material containment should be able to hold that material for an extended duration.

Lead: Department of Public Works
Other responsible parties: RIDEM
Financing options: Town Budget
Cost: Staff Time
Timeframe: Medium Term

Action #70: Recovery and Reconstruction Ordinance

The Town will consider adopting a recovery and reconstruction ordinance that will expedite the rebuilding of the town and the recovery of town services after a storm or other natural hazard event.

Lead: Department of Planning and Development
Other responsible parties: Building Official's Office
Financing options: Town Budget
Cost: Staff Time
Timeframe: Medium Term
Model: Model Recovery and Reconstruction ordinance in PAS report, Planning For Post-Disaster Recovery and Reconstruction, page 149

4.0 – Implementation

In any plan, the implementation section is one of the most important. Without a clear sense of who is responsible for a given action and in what timeframe it should be completed, many important goals can be lost. A plan must include a clear course for action.

4.1 Plan Adoption

Upon receiving approval from FEMA and RIEMA the plan was submitted to the North Kingstown Town Council and Planning Commission for final approval and adoption into the town's comprehensive plan.

The adoption of the North Kingstown Hazard Mitigation Plan into the North Kingstown Comprehensive Plan will ultimately have an affect on all nine elements of the comprehensive plan. In the land use section, further development will be directed away from hazard areas, such as the flood zones, as well as away from groundwater recharge areas. The evacuation routes and bridge maintenance make up the additions to the circulation element. Economic development is affected in many ways, from placing development away from hazard areas to forming cooperative agreements with businesses to ensure that adequate supplies are available to the town in the event of an emergency. The hazard mitigation plan will have some of its greatest influence in the community services and facilities element as outreach programs are developed to inform and prepare residents for natural hazards; as important building and site plan review processes incorporate hazard mitigation into their reviews; and as town facilities are retrofitted to protect them and the important records they contain from damage or destruction during a natural hazard. Natural and cultural resources will also be protected as plans are developed for park clean-up after a storm and methods of protecting historic buildings are researched and distributed. The open space, conservation, and recreation element will benefit from both the preserved open space in hazard vulnerable areas and the storm hazard plans that will be developed for the town's harbors. The Post Road corridor element will be influenced in the storm water management techniques and underground utility lines that will be encouraged for the purpose of hazard mitigation. Finally, the hazard mitigation plan will strongly affect the Quonset Point element in that, much of Quonset Point is located in flood zones and storm surge areas therefore requiring that new construction respect that fact and build to avoid and resist storm damage.

4.2 Implementation, Evaluation, and Revision

<u>Implementation</u>
Each action description in the previous section includes a brief statement of responsible parties, funding sources, and expected timeframe for completion. These descriptions form the basis for implementation. From this basis, actions will be incorporated into departmental work plans. Individuals, organizations, and other groups outside of town departments with responsibility for plan actions will work with the appropriate town department to form a schedule for implementation and coordination with town activities.

Evaluation

The North Kingstown Hazard Mitigation Committee will meet at the end of the first and second six-month time period to assess progress on action completion and the effectiveness of actions already completed. Changes in timeframe or other aspects of implementation will be made as necessary.

Revision

The North Kingstown Hazard Mitigation Committee will meet twice yearly to assess the effectiveness of the plan, and make revisions as necessary to improve its effectiveness. The yearly updated plan will be submitted to and reviewed by RIEMA following local approval. In addition, the committee will meet following a natural hazard event to discuss the effectiveness of plan elements and to review community input based on their experiences during and after the event.

The public will continued to be involved in the hazard mitigation planning process through our regular meetings of the Local Hazard Mitigation Committee to be held twice a year. The public can also stay involved through the use of the Town's web site www.northkingstown.org where updates to the plan, upcoming meetings and other hazard mitigation topics will be posted.

Future sea level rise will have a tremendous impact on the extent of damage caused by flooding and storms. At a minimum of 10-year intervals, the Hazard Mitigation Committee will assess the need for changes in the flood and storm surge maps and implement those changes as available technology permits. Actions and policies pertaining to properties in the current flood zones and storm surge areas will be extended to any properties falling within these new areas. In addition, hazard mitigation should be an integral part of any considerations for protecting coastal properties from sea level rise, whether by structural or non-structural methods.

APPENDIX A: TECHNICAL AND FINANCIAL ASSISTANCE FOR MITIGATION

STATE RESOURCES

Rhode Island Emergency Management Agency
645 New London Avenue
Cranston, RI 02920
Phone: (401) 946-9996

Coastal Resources Center
University of Rhode Island
Narragansett Bay Campus
Narragansett, RI 02882
Phone: (401) 874-6224

Coastal Resources Management Council
Stedman Government Center
4808 Tower Hill Road
Wakefield, RI 02879
Phone: (401) 277-2476

Department of Administration/Division of Planning
One Capitol Hill
Providence, RI 02908
Phone: (401) 277-6478

State of Rhode Island Building Committee Office
Building Commissioner's Office
One Capitol Hill
Providence, RI 02903
Phone: (401)277-3529

Rhode Island Builders Association
The Terry Lane Corporation
Terry Lane
Gloucester, RI 02814
Phone: (401) 568-8006

Department of Transportation-Design Section/Bridges
2 Capitol Hill, Room 231D
Providence, RI 02903
Phone: (401) 277-2053

Rhode Island Department of Business Regulations
233 Richmond Street
Providence, RI 02903
Phone: (401) 277-2246

State Fire Marshal's Office
272 West Exchange Street
Providence, RI 02903
Phone: (401) 277-2335

Rhode Island Banking Commission/Associate Director
233 Richmond Street
Providence, RI 02903
Phone: (401) 277-2405

Public Utilities Commission
100 Orange Street
Providence, RI 02903
Phone: (401) 277-3500 Ext. 153

Department of Environmental Management
Division of Parks and Recreation
2321 Hartford Avenue
Johnston, RI 02919
Phone: (401) 277-2635

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

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

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

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

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

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

OTHER RESOURCES

The Association of State Floodplain Managers (ASFM)
Professional association with a membership of almost 1,000 state employees that assist 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)
(formally 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 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 WWW homepage 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 NEFSMA's homepage on the Web at http://www.seacoast.com/~nefsma.

APPENDIX B: EXISTING PROTECTION SYSTEMS - FEDERAL AND STATE

National Flood Insurance Program:

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:

1. Adopt the Flood Insurance Rate Maps as an overlay regulatory district.
2. 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.
3. 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.

Community Rating System:

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 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.

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 federal-backed mortgages and improvement loans for structures located in special flood hazard areas.

State Barrier Beaches:

Your community may have barrier beaches, as defined by the state's R.I. 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 one 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.

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 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.

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).

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 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.

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 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.

APPENDIX C: Newspaper Clippings Related to Past Natural Disasters

APPENDIX D: North Kingstown Chamber of Commerce 2002 Business Resource Survey Results

ITEMS	DESCRIPTION	COMPANY NAME	TELEPHONE #
Backhoes	1-Bob Cat 853	Pleasant Street Wharf	294-2791
	2 - Ford	RI Economic Development Corp.	295-0044
	1	Sodco	294-3100
	1-Fuel-old-small	Specialty Diving Services, The	295-5256
	18-2 rubber tire excavators,8 Pippin, 8 Trach	D'Ambra Construction Co., Inc.	737-1300 265-4632
Bedding/Blankets	Yes	Hamilton Village Inn	884-1725
	24 cots, 24 blankets	RI Economic Development Corp.	295-0044
	Yes - Availability depends if we are in emerg.response as well	South County Hospital	782-8000 X1447
	20-30 Extra sheets - blankets	Sstar of Rhode Island	294-6160
	Maybe	Wickford Insurance	294-3304
	24 each-blnkets, sleeping pads.	Toray Plastics (America)Inc.	294-1550 Est.4416
Chippers	l -light duty Chipper	Print World	885-6262
	l - gasoline wood chipper	RI Economic Development Corp.	295-0044
	1-Bear Cat	Sodco	294-3100
Emergency Fuel	3 -20# propane cylinders	International Dioxcide, Inc.	295-8800
	as needed-gasoline & diesel	E.Greenwich,Quonset Pt.,NK Getty	523-5775 (cell)
	Varies-87,89,93 octane Unl.gas.	NK Shell Food Market	267-0057
	1000 Diesel	Senesco	295-0373
	1-500 gals. - Diesel	RI Economic Development Corp.	295-0044
	l gas., 1 diesel-2 above grand storage tanks	Sodco	294-3100
	20,000 gals - diesel	Specialty Diving Services, The	295-5256
	Gas/Diesel	Wickford Shipyard, Inc.	884-1725

ITEMS	DESCRIPTION	COMPANY NAME	TELEPHONE #
Emergency Fuel	4 Service trucks of fueling tanks	D'Ambra Construction Co., Inc.	737-1300,265-4632
(Continued)	1000 gals. #2 fuel oil. Toray cannot provide a delivery truck	Toray Plastics (America) Inc.	294-1550 Ext.4416
Foodstuffs	SuperMarket	Dave's Marketplace	641-0401
	Fast Food	KFC	884-6550
	1 -Mineral water, usually 25 gals	Market Models, Inc.	294-1489
	Varies, Convenience type foods.	NK Shell Food Market	267-0057
	Yes-availability depends if we are in emerg. Response as well.	South County Hospital	782-8000 X1447
	Emergency menu for 70 for 3-5 days	Sstar of Rhode Island	294-6160
	Various food supplied are available if needed	Gillian's Ale House	667-0900
	Non-perishable foods (cans, etc.)	Ryan's Market	294-9571
	100 meals, ready to eat	Toray Plastics (America;)Inc.	294-1550-Ext.4416
Forklifts	1-30,000 lb-l-7000 lb	North Atlantic Marine Salvage	294-9661
	1-5000# Propane powered	International Dioxcide, Inc.	295-8800
	May have available	JT'S Lumber	294-9661
	3-8000#6000#5000#	LJM Packaging Co., Inc.	295-8800
	2	The Lightship Group	884-5400
	1 - 3000 lb Max	Meister Grinding Tech.	295-2660
	l-1500 lb. capacity	Champlin's of Wickford	295-4600
	2 - 6,000 lb. lifts.	Quaker Lane Tool	295-5472
	7 -1 @ 48000#,1 @ 36000#, etc.	Senesco	295-0373
	2--l-6000 lb. and l-l5,000 lb.-Hiester	RI Economic Development Corp.	295-0044
	9-8 princetons (Sod handlers) l large conventional	Sodco	294-3100
	1-6,000 lb. Diesel	Specialty Diving Services, The	295-5256
	1	Wickford Shipyard, Inc.	884-1725
	3-15 Barrel truck	Anvil International	886-3030
	2 (1 Nisson 3 ton,1 Tow motor 9 ton)	D'Ambra Construction Co., Inc.	737-1300,265-4632
	1 fork lift	R. P. Morrison Company	295-3100

ITEMS	DESCRIPTION	COMPANY NAME	TELEPHONE #
Forklifts (Continued)	1 - 2 ton capacity	Ocean State Testing, Inc.	294-2258
Generators	May have inventory available	JT'S Lumber	884-5400
	Approx. 10 - 4-100 KW	The Lightship Group	295-2416
	60 - 6600 W. to 1000 W. (Ton)	Quaker Lane Tool	295-5472
	3- 2@1400, 1 @5000	Senesco	295-0373
	3 Portable,2,600 watts, l-l,500 wts, 3-trailer-60M,70M,30M watts	RI Economic Development Corp.	295-0044
	6 -60W, 20W, 5 W-(3) 4 W. Gas.	Specialty Diving Services, The	295-5256
	own generator for facility	Sstar of Rhode Island	294-6160
	2 (1 50KW, 1- 300Amp. Generator	D'Ambra Construction Co., Inc.	737-1300,265-4632
Haz-Mat Equipment	May have inventory available	JT'S Lumber	884-5400
	1-56 ft oil spil res.Boat Oil Boom	North Atlantic Marine Salvage	294-9661
	1 Oil spill Kit	Eric Collins	294-2791
	Yes	RI Economic Development Corp.	295-0044
	Yes, Availability depends if we are in emerg.response as well.	South County Hospital	782-8000 Ext. 1447
	2 Confined space entry system-gas detector	D'Ambra Construction Co., Inc.	737-1300,265-4632
	Some, Toray maintains material for on site emergency.	Toray Plastics (merica) Inc.	294-1550 Ext. 4416
Heavy Equipment	Crane (s) -may have available	JT'S Lumber	884-5400
	1-L53400 Link Belt Ex. 68,000 lbs	North Atlantic Marine Salvage	294-9661
	4 cranes,1-30T,2-250T,1 truck-180	Senesco	295-0373
	2- Bulldozer, Excavator	Sodco	294-3100
	5 Cranes, Barges, Tug boats-Boom truck, 21 ton crane	Specialty Diving Services, The	295-5256
Loaders	1	Sodco	294-3100
	l Front End loader	Anvil International	886-3030
	14 CAT 938, 950, 966,980,988	D'Ambra Construction Co., Inc.	737-1300,265-4632

ITEMS	DESCRIPTION	COMPANY NAME	TELEPHONE #
Medical Supplies/	First Aid Kits, AED	Senesco	295-0373
services	Yes,Availability depends if we are in emerg. response as well.	South County Hospital	782-8000 Ext. l447
	2-RN's and Aids on dutyj-24-7 minimum supplies	Sstar ofRhode Island	294-6160
	Physical Therapy Equipment only	Tente Physical Therapy	294-0455
	3 to 6 people for medical and dental service-vaccine	Bayside Family Health	295-9706
Portable lighting	May have inventory available	JT'S Lumber	884-5400
	1 flashlights	Market Models, Inc.	294-1489
	Many	The Lightship Group	295-2416
	2 light towers	Senesco	295-0373
	1 - 6,500 watts	RI Economic Development Corp.	295-0044
	2 Ingersoll Rand light generators	D'Ambra Construction Co., Inc.	737-1300,265-4632
Storage facilites	Limited	Colonial Liquor	932-9224
	Yes-Different tyypes	The Lightship Group	295-2416
	2-400-000 sq.ft(Warehouse)	Maro Display, Inc.	294-5551
	Basement 7500 sq ft.,cement floor Quaker Lasne Tool	Quaker Lane Tool	295-5472
	3 acres outside storage, QP / Davisville Industrial Park	Specialty Diving Services, The	295-5256
	Limited To small basement area	Sstar ofRhode Island	294-6160
	Large building with storage rooms	US Postal Service	884-3760
	2 -indoor warehouse/outdoor aggregate shed	D'Ambra Construction Co.,Inc.	737-1300,265-4632
	Covered storage are is available,if needed	Gillian's Ale House	667-0900
	6 Box trailers can be used for storage	Toray Plastics (America) Inc.	294-1550-Ext. 4416
Sump pumps	May have inventory available	JT'S Lumber	884-5400
	Many	The Lightship Group	295-2416
	1-120 ac-300 gal. a minute		

ITEMS	DESCRIPTION	COMPANY NAME	TELEPHONE #
Sump pumps	30 - 1-l/2 D24 GPM	Quaker Lane Tool	295-5472
(continued)	3 -Electric submersible	RI Economic Development Corp.	295-0044
	several - diesel and gas	Specialty Diviing Services, The	295-5256
Support Services	l Pastoral Care	Living Hope Christian Church	886-7692
	Yes, Availability depends of we are in emerg. response as well.	South County Hospital	782-8000 X1447
	Engineering/Trenching	D'Ambra Construction Co., Inc.	737-1300,265-4632
	4 to 5 people as possible	Bayside Family Health	295-9706
Trucks-digger	1 - Cram. Digger truck	North Atlantic Marine Salvage	294-9661
	1 - Grade-all	D'Ambra Construction Co., Inc.	727-1300,265-4632
Trucks-dump	1 dump truck	Apple Construction	885-4111
	5 trucks	RI Economic Development Corp.	295-0044
	2-Farm trucks-not suitable for the road	Sodco	294-3100
	LLV Postal Vehicles	US Postal Service	884-3760
	20 (10 Ten wheel/10 Trailer Dump/1 lowbed)	D'Ambra Construction Co., Inc.	737-1300,265-4632
Trucks-pick-up	1 Pick-up truck	Apple Construction	885-4111
	8' Bed Pick up Truck	Paul Bailey's Dodge	884-3300
	15 Passenger Wagons	Paul Bailey's Dodge	884-3300
	1 ton with lift gate, capac. 2M lbs.	Barr Lobster	295-5959
	l ton-no 4 wheeldrive 3500 series	Hammond Farm	295-5588
	Should have available	JT'S Lumber	884-5400
	Should have available	JT'S Lumber	884-5400
	2	Pleasant St. Wharf	294-2791
	4	The Lightship Group	295-2416
	1-5150 pick-up	McKays Furniture	295-1915
	also 2-15' Box Body	McKays Furniture	295-1915

ITEMS	DESCRIPTION	COMPANY NAME	TELEPHONE #
Trucks-pick-up	2 pick-up trucks	Pleasant St. Wharf	294-2791
(continued)	2 pick-up trucks	Senesco	295-0373
	2- Ford Rangers	Sodco	294-3100
	4	Specialty Diving Services, The	295-5256
	2	Anvil International 886-3030	886-3030
	4 pickup trucks	D/Ambra Construction Co., Inc.	737-1300,265-4632
	1	Heritage Homes, Inc.	884-7500
	2-short beds	Howes Lubricator Products	294-5500
	l - 1/2 ton pick-up	Ocean State Testing Inc.	294-2258
	2	Toray Plastics (America) Inc.	294-1550, Ext. 4416
Trucks-stake body	1-F350 444	North Atlantic Marine Salvage	294-9661
	2	RI Economic Development Corp.	295-0044
	1	Specialty Diving Services, The	295-5256
	1	Anvil International	886-3030
	2	The LightshipGroup	295-2416
	16	D'Ambra Construction Co., Inc.	737-1300,265-4632
Turf/Lawn Equipment	Various - Field Prep.& mowing equipment, for large areas	Sodco	294-3100
	1 Bobcat	D'Ambra Construction Co., Inc.	737-1300,265-4632
	Lawnmowers	Heritage Homes, Inc.	884-7500
Volunteers	Possible	Advanced Pharmacy Concepts	295-7660
	2	Colonial Liquor	932-9224
	1-2	Joseph H. Conley, CPA	294-1555
	Some skilled-unlicensed & licenc.	Dave's Marketplace	641-0401
	May have available	JT'S Lumber	884-5400
	2	Key Accounts	295-0808

ITEMS	DESCRIPTION	COMPANY NAME	TELEPHONE #
Volunteers (continued)	20-Various skills & abilities	Living Hope Christian Church	886-7692
	8-each employee would help out	Market Models, Inc.	294-1489
	1	David Meegan, Esq.	294-1100
	From 2-10	The Lightship Group	295-2416
	Contact first	Maro Display, Inc.	294-5551
	1	Natelli Systems	294-4811
	1-6, myself,possibly avail.empl.	N.K. Shell Food Market	267-0057
	2-3	Print World	885-6262
	2	Quaker Lane Tool	295-5472
	1-myself	Sign-a-Rama	886-5000
.	Operations Staff- Number assigned according to event	RI Economic Development Corp.	295-0044
	Depends on business needs at the time.	Sodco	294-3100
	Yes	South County Hospital	782-8000 X 1447
	4	Specialty Diving Services, The	295-5256
	Possibly	Sstar of Rhode Island	294-6160
	One-myself	Tente Physical Therapy	294;-0455
	10	US Postal Service	884-3760
	3	Washington Trust Co.	295-4700
	As required	Anvil Internatonal	886-3030
	Workforce- laborers,equipment operators,truck drivers	D'Ambra Construction Co., Inc.	737-1300,265-4632
	Up to 6 - Depending upon what request is for	Howes Lubricator Products	294-5500
	Two	Torgen & Callaghan, Esqs.	885-1200
	Yes - but unsure	Wickford Insurance	294-3304
	1	Richard B. Carpenter	294-3327
	4 volunteers	Wilson's of Wickford	294-9514
Water pumps	Many	The Lightship Group	295-2416
	3-5 3-350 gal. a min. 5- 450 gal	North Atlantic Marine Salvage	294-9661
	1-l0" Diesel	Senesco	295-0373

ITEMS	DESCRIPTION	COMPANY NAME	TELEPHONE #
Water pumps	4 - Gasoline 2-21/2" and 2-3"	RI Economic Development Corp.	295-0044
(continued)	Several-6" down to 1&l/2"-Diesel, Gas, Electric	Specialty Diviing Services, The	295-5256
	own wells and storage	Sstar of Rhode Island	294-6160
	Many	The Lightship Group	295-2416
	l water pump	Wilson's of Wickford	294-9514
Misc	36 ft. lobster boat	Barr Lobster	295-5959
	Subarau-Outback (all wheel drive	Key Accounts	295-0808
	12' Amsbury Runabout-8 hp	David R. Meegan, Esq.	294-1100
	4x4 Vehicle	LJM Packaging Co., Inc.	295-2660
	4x4 Vehicles	Maro Display	294-5551
	4x4 Vehicle	Natelli Systems	294-4811
	4x4 Vehicle	North Atlantic Marine Salvage	294-9661
	l-12' Refrigerated Box	Champlin's of Wickford	295-4600
	General Merchandise	Ocean State Jobbers	295-2672
	l Power Washer - gas	Print World	885-6262
	1-9 passenger Van	Senesco	295-0373
	Subarau-Outback (all wheel drive		
	Boats, chainsaws, air compressers, etc.	Specialty Diving Services, The	295-5256
	Pressure Washer & Water Recyl. Equipment	Hyland Equipment Co., Inc.	295-9700
	Graders, dozers, air compressors	D'Ambra Construction Co., Inc.	737-1300,265-4632
	Trenching - hydraulic jacks, misc.steel trench shields	D'Ambra Construction Co., Inc.	737-1300,265-4632
	1 Terea 30 ton crane - misc. steel plates	D'Ambra Construction Co., Inc.	737-1300,265-4632
	As needed-fuel additives, penetrating oil	Howes Lubricator Products	294-5500
	Legal Services	Torgen & Callaghan, Esqs.	885-1200
	Welding	Ocean State Testing, Inc.	294-2258
1	Toray owned gymnasium,could be used as temp. shelter	Toray Plastics(America) Inc.	294-1550 Ext. 4416
2	Mobile wastewaterstorage tanks (FracTanks)21000 gal.each	Toray Plastics(America) Inc.	294-1550-Ext. 4416
3	up to 5 available	Toray Plastics(America) Inc.	294-1550-Ext. 4416