NATURAL HAZARD

MITIGATION PLAN

OF THE

TOWN OF BRISTOL, RHODE ISLAND

PREPARED BY THE BRISTOL HAZARD MITIGATION COMMITTEE
JUNE 2009
AS REVISED JUNE 2010 PER FEMA REVIEW

Purpose:

The purpose of this report is to recommend actions and policies for the Town of Bristol to minimize the social and economic loss or hardships resulting from hazardous events. The Town and the Bristol Hazard Mitigation Committee realize that successful hazard mitigation is an ongoing process that requires implementation, evaluation, and updated revisions to this report. It is intended that this report and the ongoing efforts of the Local Hazard Mitigation Committee will preserve and enhance the quality of life, property, and resources for the Town of Bristol.

This document will be available electronically on www.state.ri.us/riema and on the Town of Bristol web site at www.bristolri.us upon approval.

Cover Photo of Hurricane Bob 1991 Courtesy of NOAA

Strategy for Reducing Risks from Natural Hazards in Bristol, Rhode Island

A Multi-Hazard Mitigation Strategy

Acknowledgements

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State Assistance

The project has moved forward thanks to the support and resources provided by the Rhode Island Emergency Management Agency with special acknowledgement to Lawrence Macedo, Hazard Mitigation /Public Assistance Coordinator.

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Introduction to Hazard Mitigation in Bristol, Rhode Island

Section 1.1 What Hazard Mitigation Can Do for Bristol

Bristol has an *Emergency Response Plan*, so hasn't the Town already mitigated hazards? – A common question that arises when the topic of "Hazard Mitigation" is introduced at a community-wide scale. While hazard mitigation is by no means a new concept to Bristol, this plan is intended for a wide audience of residents, businesspeople, governing boards, and agency officials; so the text shall make a brief distinction between emergency response and hazard mitigation.

> We plan for *emergency response* in order to react efficiently during a hazardous event, such as a hurricane, flood, or blizzard.
>
> Conversely, we pursue *hazard mitigation* in order to decrease the demand for emergency response and to protect community resources that even the best response could not safeguard.

In answering the call of past emergencies, we as a town have learned about where we are vulnerable and when we are unable to defy risk and still react with success. These lessons are combined with technical knowledge of our landscape, as well as ocean and weather patterns, to create scenarios –or plausible stories –of disastrous outcomes. Hazard mitigation is the effort to intervene in those storylines of mayhem and calm the tenor of unwanted suspense.

In pursuit of a unified effort by a well-informed and conversant public, the terms "Disaster Resistance" and "Hazard Resilience" also warrant clarification.

> *Disaster resistance* is the general avoidance of massive and unwelcome impacts, including deaths and material losses, as well as the social and economic havoc that tends to accompany it. Disaster resistance is the *central goal* of hazard mitigation.
>
> *Hazard resilience* is the ability of an at-risk structure or municipal system to confront and withstand the brunt of a hazard. Improved resilience, achieved through retrofitting and code enforcement, is *one method* of increasing disaster resistance.

There are several approaches to disaster resistance, but common threads persist: each requires money, time commitments, and a degree of openness to

change. So, what is our incentive? Why should we dedicate resources to hazard mitigation and moreover, why should we question some of our decisions and habits?

The following list *does not* imply a likelihood of risk with reference to Bristol, but instead, sets forth the types of damages and expenses endured time and again by communities facing hazards similar to our own.

LOSSES ASSOCIATED WITH INACTION

Initial Damages

- Casualties including residents, tourists, rescue personnel, pets, and livestock
- Infrastructure damage and prolonged interruption of utility services
- Temporary and permanent business closings
- Damage to invaluable historic structures
- Loss of vital government records and documents
- Loss of personal property including items of irreplaceable sentiment

Expenses and After-Effects

- Emergency response costs, such as triage supplies
- Facility and infrastructure repairs
- Debris and contamination cleanup
- Depreciated real estate values
- Lost wages and sales tax revenue
- Reluctance of new business starts
- Permanent environmental damage via secondary “technological” hazards
- Home rebuilding costs and homeowner relocation costs

While prevention of unwanted outcomes is sufficiently compelling, it is also nice to know that some mitigation activities can produce benefits for the community

that are felt immediately or that are related to other social, economic, and environmental goals. Proponents often champion hazard mitigation in light of "simultaneous gains," as opportunities for multi-objective expenditures and fiscal prudence.

GAINS ASSOCIATED WITH MITIGATION ACTIVITIES

Foremost Benefits

- Defense of human life and health
- Protection of municipal (tax-payer) investments
- Stability of local economy

Furthering Other Community Goals in Unison

- Conservation of natural lands and enhanced recreational opportunities
- Reduced government overhead for response and recovery personnel/ equipment
- Incorporation of more durable, higher efficiency, or "best of breed" technologies
- Attraction and retention of businesses through hazard-safe facilities
- Appreciation of land values via market capitalization of hazard resilience
- Compliance with Americans with Disabilities Act
- Historic preservation
- Brownfields redevelopment
- Urban beautification

Section 1.2 Bristol's Mission Statement

The purpose of the Bristol Hazard Mitigation Plan is to preserve and enhance the quality of life, property, and resources for the residents of Bristol by:

- Identifying areas at risk from natural hazards; and,
- Implementing priority hazard mitigation actions in order to protect the Town's residents, built environment, historic, cultural, economic and natural resources.

Section 1.3 Goals

The goals of the Bristol Hazard Mitigation Plan are to:

1. Protect the public health, safety and welfare
2. Reduce property damages caused by hazard impact;
3. Minimize social dislocation and distress;
4. Reduce economic losses and minimize disruption to local businesses;
5. Protect the ongoing operations of critical facilities;
6. Reduce the dependence and need for disaster assistance funding after disasters;
7. Expedite recovery disaster mitigation efforts during the recovery phase;
8. Provide an ongoing forum for the education and awareness of natural hazard mitigation issues, programs, policies, and projects.

Section 1.4 Planning Process

The following describes the planning process for this original Local Hazard Mitigation Plan. Although this plan has been in process over a period of time, it is noted that this is an original local hazard mitigation plan, and not an update, since it had never been approved by FEMA.

The Town Administrator appointed a 9-member Bristol Hazard Mitigation Committee who provided input to the plan preparation. Although the project was completed by the group as a whole, the Director of Community Development led the Committee. The Committee solicited historical information from residents though the local newspaper, The Bristol Phoenix, who ran an article on the planning process. After the draft plan was completed, the Bristol Planning Board reviewed and adopted same at a public meeting on February 5, 2003. The plan was revised to address the comments of the Planning Board and then submitted to the Town Council. The Town Council held a public hearing on the plan and adopted same on March 12, 2003. Copies of the hearing notice and minutes from the Planning Board and Town Council are included in Appendix A of this document.

Upon adoption by the Town in 2003, the Hazard Mitigation Plan was forwarded to the Rhode Island Emergency Management Agency (RIEMA) and then the Federal Emergency Management Agency (FEMA) for review.

Review comments were received from FEMA indicating that the action items needed to be refined and prioritized. In amending the plan to satisfy the FEMA comments, the Committee revised the plan in recognition of the FEMA Local Multi-Hazard Planning Guidance of July 2008, including addressing repetitive loss structures, description of Bristol's participation in the NFIP and identifying, analyzing, and prioritizing actions related to continued compliance with the NFIP.

FEMA reviewed the revised 2009 plan and forwarded comments back to the Town just prior to the March 2010 storm event. During subsequent review meetings with FEMA, the Town was asked to review the plan in consideration of the recent March 2010 flooding to see if any actions to address damages from that flooding event needed to be added to the list of action items. The Bristol Hazard Mitigation Committee reviewed the document and met on June 11, 2010. The plan was revised and amended to reflect the March 2010 storm and new Mitigation Actions were added. Local businesses that were impacted, such as the Bristol County Medical Center, which experienced significant impact from sewage backup, were also asked to review and provide any new suggestions they may have for hazard mitigation. The planning process reviewed town plans, programs, regulations and policy reports and corss referenced and incorporated in this Plan the relevant sections.

This revised plan (June 2010) has also been forwarded to the neighboring towns of Warren and Portsmouth, as well as, Roger Williams University in Bristol. The

draft document was made available for public review on the Town of Bristol web page and presented for public comment at a Town Council meeting. This plan was prepared by the Town of Bristol Community Development Office and the Bristol Hazard Mitigation Committee with input from members of the Town Council, reviewers of the draft plan, and town citizens. Comments received were incorporated in the final document as appropriate.

The 2010 revised plan will be presented to the State RIEMA and FEMA for preliminary approval. Upon receipt of preliminary approval, the Town will hold a public hearing to allow the public an opportunity for additional comments. Following this hearing, the Town Council is prepared to formally adopt the revised plan, through a resolution of the Town Council, in order to receive final approval.

It is the intention of the Bristol Hazard Mitigation Committee that The Bristol Hazard Mitigation Plan (BHMP) be an available and pertinent source of information to a wide variety of individuals and interests. The plan also has a specific and pragmatic function. By identifying and prioritizing local mitigation needs, the plan has already served, and will continue to serve, as a *basis for amendments* to local policies and regulations. The plan will be adopted by the Town of Bristol upon receipt of preliminary approval from the RIEMA and the FEMA.

In September 2008 The Town of Bristol updated the Comprehensive Community Plan which was drafted by the 60-member Comprehensive Plan Public Advisory Committee. Many of the policies and action items from this Hazard Mitigation Plan have already been incorporated into the updated Comprehensive Plan. The Comprehensive Plan will be amended as necessary to comply with the provisions of this mitigation plan once adopted. (see Section 3.3).

As the BHMP is implemented, additional regulations and steering documents may be subject to compliance. Likewise, the routines of some government departments and related agencies may be adjusted to reflect the aspirations of the plan. On relevant matters, the plan can serve as a *budgetary and administrative guide* to decision-making entities, such as the Town Administrator and Town Council.

For Bristol, like most towns, costly mitigation projects are an impracticable luxury in the absence of external funding. Thus, the preparation of this hazard mitigation plan is closely tied to the pursuit of financial assistance. The Hazard Mitigation Grant Program, or “The 404 Program,” of the Federal Emergency Management Agency (FEMA) is the primary vehicle. Based on State priorities and available funds, the RI SHMC will conduct preliminary eligibility review of

projects submitted by Bristol for funding. The State will serve as a grant manager for projects ultimately approved by FEMA.

Projects commonly receiving funds include:

(1) Acquisition and relocation of repetitively damaged structures,
(2) Retrofitting of vulnerable structures,
(3) Construction of minor flood controls, and
(4) Development of an official local hazard mitigation plan.

State authorities will incorporate information compiled in this document into the State Hazard Mitigation Plan, to strengthen the statewide knowledge and idea-base for mitigation planning. Appendix B describes other resources for technical and financial assistance. A well-prepared and locally adopted plan can demonstrate understanding and commitment, two important variables when vying for limited, high-demand resources.

CHAPTER 2 HAZARD RISK ASSESSMENT

Section 2.1 Risk and Vulnerability Overview

As indicated in the mission statement, the purpose of this plan is to determine which areas of the Town may be affected by natural hazards, how likely it is that a given hazard may occur and how intense the hazard might be.

For each of the areas identified as vulnerable to a natural hazard, the Bristol LHMC examined the Town's risk from the hazard including the primary problem or effect. The result of this process was the preparation of a Risk Assessment Matrix that lists the vulnerable areas and the primary effects from an event on these areas. The matrix was then used to establish mitigation benefits and develop mitigation strategies. The LHMC utilized municipal records, local knowledge and historical accounts to formulate the matrix.

Bristol is a peninsula jutting into Narragansett Bay with 41 miles of coastline making it susceptible to wind and tides on three sides. Historically, Bristol has sustained damage from flooding and high winds associated with hurricanes, nor'easters and heavy rains. According to FEMA, between 1978 and 2002, Bristol had 83 claims totaling $571,416.

However, this strategy addresses multiple natural hazards, even those assessed with low probability.

2.2 Development Trends

Residential Development Trends

As of the 2000 census, Bristol has a population of 22,469 with 8,705 residential dwellings. The number of housing units increased 9.4% over the 1990 census. Historically the Town issues approximately 50 building permits per year, although 82 and 83 permits were issued in 2002 and 2003 respectively. All but a handful of building permits issued in recent years have been for single-family dwellings. Population increased 3.9% between 1990 and 2000, while the number of households increased 12.4%. The off-campus student population of Roger Williams University also contributes to the number of households. Of the total residential units, 66% are renter occupied units and 34% are owner occupied. The majority of housing units in Bristol are single-unit detached (i.e. a typical single-family home); however, there are a number of 2-3-and 4 unit structures. .

Commercial and Industrial Development Trends

Buildings in town can be categorized as follows: 70% residential; 20% commercial; and 10% industrial. Bristol has a historic waterfront downtown comprised of mixed use commercial and residential buildings

In the past decade, new commercial development has been constructed on vacant land in Bristol or occurred through redevelopment, reuse or additions to existing commercial buildings. The newest addition includes Walgreens on Metacom Avenue which was significant because it includes a connector road between Gooding Avenue and Stop and Shop.

A large downtown redevelopment project, the former Belvedere Hotel is being redeveloped into mixed-use condominiums. In addition, buildings for boat building industries have been developed in the East Bay Industrial Park and buildings for similar Marine Trade industries have been developed off Franklin Street.

Over the past 10 years, approximately 350,000 square feet of industrial development has occurred in the East Bay Industrial Park and other industrial areas.

Rehabilitation plans for the former Fulflex site at Buttonwood and Franklin Streets is in process. The proposal is to reuse this site for manufacturing with the construction of new industrial buildings.

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Roger Williams University Development

Roger Williams University has continued to expand on their campus at Ferry Road and Metacom Avenue under the Educational Institutional Master Plan process. Recent improvements include: new dormitory buildings, parking structure, main entrance gate house, student union, addition on architecture building, addition on gymnasium, new classrooms, admissions building, natural and marine sciences building, and a water tower. It is noted that the University's vision for the campus is to keep it pedestrian oriented with walkways and green space through the center of campus keeping parking lots on the north and south edges.

Natural Historical and Cultural Resource Trends

The Town's commitment to open space preservation has led to the preservation of approximately 200 acres of land over the last 10 years. Preservation of the Mount Home Farm and 20 acres of land on Narrows Road known as Waypoyset Trust was important, not only for the open space, but also for the major historical and cultural significance value of these properties. Approximately 6 acres of open space property acquired in the Tanyard Brook watershed improves the watershed and removed flood plain from potential development.

In 2006, the Town passed a bond referendum for $3 million to acquire and preserve open space parcels. The Town also established an Open Space

Committee to develop an open space plan and a system to prioritize the properties being considered which includes a rank for amount of flood prevention achieved.

Consistent with the goals for preservation, the Town rezoned a number of significant public open space parcels from either business or residential zones to the Open Space zone.

Section 2.3 Identified Hazards

Hurricanes and Coastal Storms

Floodplains in Bristol include "AE", "VE" and "X" Zones. "AE" Zones are areas that would be inundated by the 100-year flood. "VE" Zones are velocity zones that are subject to breaking wave action where waves greater then 2.9 feet are forecasted during a 100-year flood or storm surge. "X" Zones are areas that would be inundated by the 500-year flood. Approximately 40% of the Town is located within a flood plain, including the 500-year flood areas. Map 1, "Risks in Bristol" depicts the FEMA flood zones.

Since 1865, Bristol has experienced seventy-one hurricanes of varying magnitude. The following table depicts the eight most severe.

Table 1. Significant Rhode Island Hurricanes from 1935 to 1999

Date	Name	Type	Maximum Winds (mph)	Property Damage ($ millions)	Deaths
Sept. 21, 1938	N/A	Westward	115	100	262
Sept. 14, 1944	N/A	Rhode Island	95	2	0
Aug. 31, 1954	Carol	Westward	110	90	19
Sept. 11, 1954	Edna	Eastward	75	0.1	0
Aug. 19, 1955	Diane	Eastward	75	170	0
Sept. 12, 1960	Donna	Westward	75	2.4	0
Sept. 27, 1985	Gloria	Westward	90	19.8	1
Aug. 19, 1991	Bob	Rhode Island	75	115	0

Source: 1998 Journal Bulletin: Rhode Island Almanac, 112th Annual Edition
Rhode Island Hurricanes and Tropical Storms: A Fifty-Six Year Summary, National Weather Service Office, Providence, RI

In 1985, Hurricane Gloria left the town without power for three days. Along with the interruption of school and business activity, the roof of the Defiance Fire Station was destroyed. The loss to the Tasca Ford dealer was so bad as a result of the 1954 Hurricane that the dealer moved out of Town.

The “most recent” hurricane occurred in 1991 which was 18 years ago. There is a concern that “new” residents to this area haven’t experienced a hurricane and therefore do not fully comprehend the risks associated with this type of natural hazard.

A coastal flood spurred by strong winds in July of ‘96 and a tidal surge in January of ’97 resulted in beach erosion and inundation of town streets.

Inland Floods

Bristol’s geology includes large areas of bedrock and/or high groundwater. As a result, there are areas of poor drainage that become flooded even with heavy rain storms. Many of Bristol’s local roads become flooded during a heavy rain storm impacting residents in these neighborhoods and causing property damage.

The State of Rhode Island experienced heavy rain fall and documented hurricane-force winds during storms that affected the State between the dates of March 12, 2010 through March 31, 2010. The most affected areas where Kent County, which received up to 3.68 inches, Providence County, which received up to 5.71 inches, and Washington County which received 5.55 inches of rain over that time frame. The monthly rain total in Providence RI was at 16.32 inches, making March the city’s all- time wettest month on record.

The Pawtuxet River went into major flood stage on the evening of March 14th. On March 15th, the Pawtuxet River hit historic levels cresting at 14.98 feet. The previous record amount was 14.5 in 1982. Due to historic flooding caused by the heavy amount of rainfall and hurricane-force winds, households and businesses along the Pawtuxet River were severely damaged.

Across Kent County, including the City of Warwick and the Towns of Coventry, East Greenwich, and West Greenwich, there was further devastation along the river’s path as well as other bodies of water that were already swollen from the previous storms.

Providence County was also affected by the Pawtuxet River’s flooding, particularly the city of Cranston, which has historically been flood-prone in low-lying areas. At Providence, 5.32 inches of rainfall was observed on March 30 which was the 5th largest daily rainfall record for the site. The two-day total (March 30 and 31, 2010) was 8.79 inches; breaking the previous all-time record of 7.84 inches set on October 14-15, 2005. Providence also set a new all-time monthly record of 16.34 inches, breaking the previous record of 15.38 inches set for October in 2005.

North Kingstown, RI topped the rainfall totals list with 9.47 inches; followed by Warwick, RI with 8.74 inches.

Most of the damage in Bristol County was from rainfall, water runoff, and wind damage. The Town of Bristol has two rain gauges that were collecting rainfall data during March 2010 – the gauge located at the Silver Creek Pumping Station reported 16.67" of rain and the gauge located at Mount Hope Pumping Station reported 14.72" of rain during this period. The difference in the totals was believed to be as a result of the wind. On April 2, 2010 the FEMA major disaster declaration for the State of Rhode Island was amended to include Bristol County.

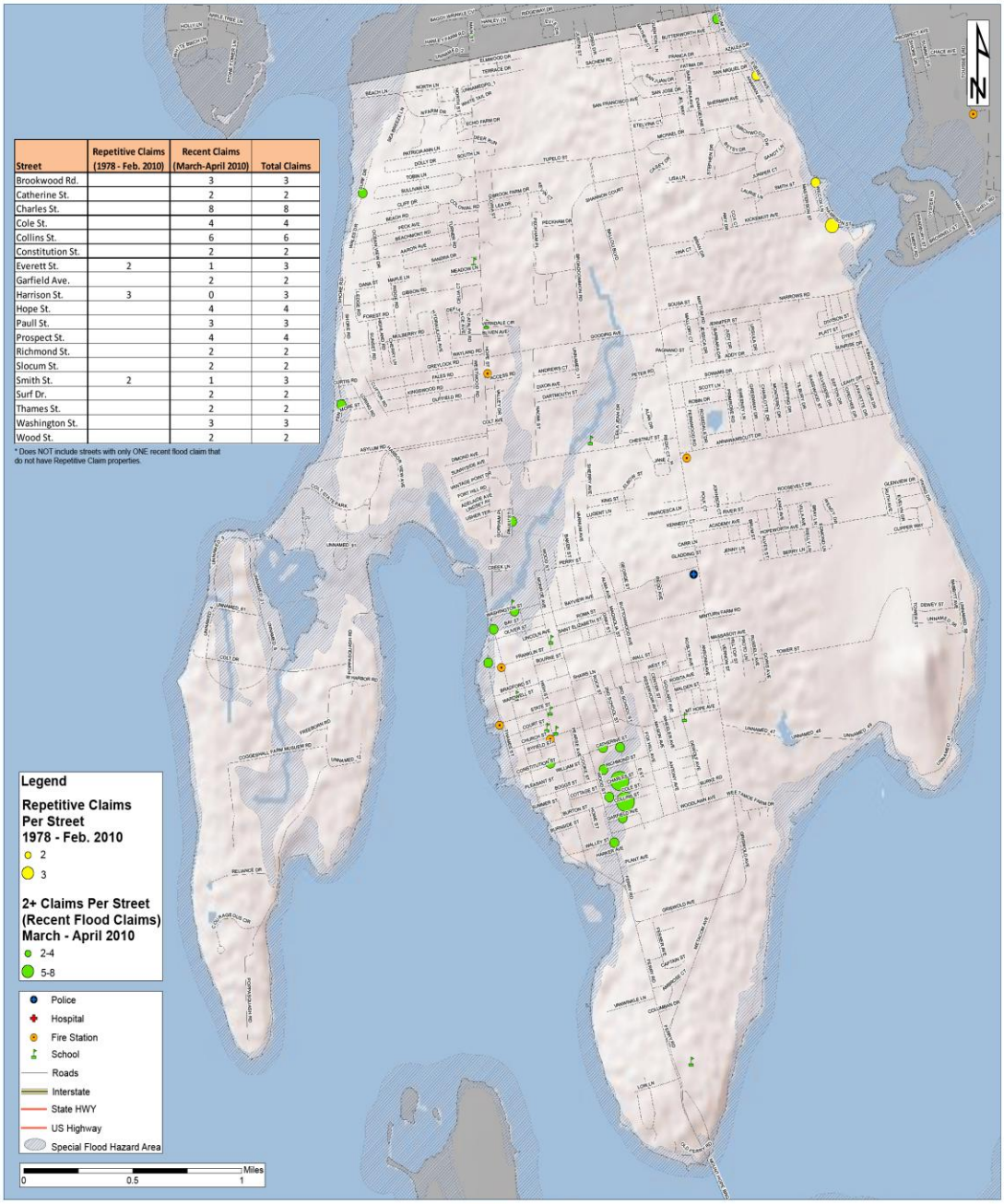
As noted in Table 2, this type of heavy rain event has occurred more frequently in the past several years.

Tanyard Brook - The properties in the southern watershed of the Tanyard Brook experience flooding problems during major rainstorms combined with high tides with the most recent event occurring in March 2010. Heavy Spring and Fall rain

events in 2007 and 2008 also caused flooding in this neighborhood which was exacerbated due to frozen ground. All but a small segment of the Brook is contained in a culvert which is undersized and influenced by the tides. The Town has begun implementation of the Tanyard Brook Watershed study which was commissioned by the Town and prepared by Beta Group in 2002. The project will include enlarging the culvert, installing a tide gate at the outfall; and , removing sewer lines that constrict the flow through the culvert under Hope Street. A Town-wide bond referendum was approved for the funding of Phase 1 in 2006. The project has recently received permits from the Rhode Island Department of Environmental Management and the RI Coastal Resources Management Council. In addition to the infrastructure upgrade, the Town of Bristol adopted an ordinance that regulates storm water runoff from new development in this watershed.

Following the March 2010 storms, the FEMA Joint Field Office in Rhode Island created a map showing the streets in Bristol where there were more than two Flood Insurance Claims made.. The mapping demonstrates that the area of the Tanyard Brook had more claims and higher requests for individual assistance than other neighborhoods with 6 streets having between 2-4 claims and 2 streets having between 5-8 claims The street with the highest number of claims was Charles Street.

FEMA 1894 - DR - RI



Street	Repetitive Claims (1978 - Feb. 2010)	Recent Claims (March-April 2010)	Total Claims
Brookwood Rd.		3	3
Catherine St.		2	2
Charles St.		8	8
Cole St.		4	4
Collins St.		6	6
Constitution St.		2	2
Everett St.	2	1	3
Garfield Ave.		2	2
Harrison St.	3	0	3
Hope St.		4	4
Paull St.		3	3
Prospect St.		4	4
Richmond St.		2	2
Slocum St.		2	2
Smith St.	2	1	3
Surf Dr.		2	2
Thames St.		2	2
Washington St.		3	3
Wood St.		2	2

* Does NOT include streets with only ONE recent flood claim that do not have Repetitive Claim properties.

Special Flood Hazard Areas Bristol, RI

FOR COMMUNITY PLANNING PURPOSES ONLY

FEMA

Department of Homeland Security
Federal Emergency Management Agency
Date Created: May, 26, 2010
Author: Mitigation GIS
File: L:/GIS/00-mxd/Bristol_Risk.mxd

Silver Creek - In 2007, the Town of Bristol commissioned a watershed study for the Silver Creek Watershed which was completed by Beta Group. This area of Hope Street where the Silver Creek discharges into the Harbor is frequently flooded during heavy rain storm events particularly when combined with high tides. In a partnership with Save The Bay, and funding from the Natural Resources Conservation Services, Fuss and O'Neill Engineering was also engaged to review the condition at the outfall where restrictions created serious flooding of Hope Street. The goals of the review was to determine what improvements could be made remove the restrictions for flood prevention and also to improve the flow of water into and out of the salt marsh in an effort to restore the health of the marsh. The engineering study recommended removing the existing restrictions, including large rip rap stones that had fallen and were blocking the outfall and raising a foot bridge that was creating a restriction further up in the marsh. This work has recently been completed and it is expected to improve the flushing of the Silver Creek salt marsh as well as reduce the flooding. More work is needed to remove sediment from this area to further improve the flood storage capacity of the marsh. The Rhode Island Department of Transportation has also recently completed drainage improvements along Hope Street in this area which are also expected to mitigate the flooding. The Town has recently completed an upgrade to the Silver Creek culvert that crosses through the St. Mary's Cemetery which will mitigate impacts to the graves in the cemetery. Additional work is needed in the area of the high school property on the north side of Chestnut Street where Silver Creek flooding also occurs. Following the March 2010 storms, the FEMA Joint Field Office in Rhode Island created a map showing the streets in Bristol where there were more than two Flood Insurance claims. The mapping indicates that there were several streets in the Silver Creek area that had between 2-4 claims during the recent flood events of March 2010.

Windstorm

As noted in Table 1 above, Bristol has experienced 8 hurricanes of varying magnitude since 1938. The strong winds that accompany hurricanes can create debris problems including downed power lines which can lead to business interruption. A review of past wind damage reveals that Bristol's significant and

historic street trees pose a special wind hazard risk. For example debris, especially fallen tree limbs, was a major problem with Hurricane Bob.

Severe Winter Storm

Winter storms often include natural hazards such as extreme winds, coastal erosion and flooding. Utility and power lines can break from the weight of snow or ice coupled with strong winds. This could put residents at risk of losing heat, electricity and water (if using well water). Snow melting poses problems as well such as road flooding in low lying areas. The Town has experienced heavy snow and winter storms which have become more frequent over the past several years. The Blizzard of 1978 was the most serious winter storm in Rhode Island.

Wildfires

Wildfire is not considered a high risk in Bristol because there are not many wooded areas or grassy fields. The Town is mostly residential and developed areas of town have fire hydrants adequately spaced. Special consideration should be given to wooded areas such as Mount Hope which may be susceptible to spreading fires as a result of lightning. This area also has limited access for fire trucks.

Earthquakes

Bristol recently has been found to have some of the youngest exposed fault zones in New England exposed on the east side of Mount Hope and a zone of seismic activity is emerging from Swansea to the Sakonnet. These need to be further evaluated, but for the present the area of potential earthquake damage appears to be essentially along the harbor front according to resident expert Dr. Patrick J. Barosh. A minor earthquake occurred in Bristol in 1996 and there was no damage reported. On March 6, 2002 another minor earthquake was felt in the southern part of Bristol. The faults in this area are shallower and less powerful then those in other parts of the Country. Bristol is in a seismic source zone VII according to the "Map of New England and adjacent areas showing seismic source zones and their maximum expected epicentral Intensity" (modified from Krinitzsky, 1986 and revised by Barosh, 1999) which is used by the US Army Corps of Engineers.

Tornado

The risk of tornado is considered minimal; however, a tornado did touch down in Bristol in 1991 and followed a path across Bristol Point and Poppasquash Point. The majority of the damage was a result of downed trees.

Dam Failure

The State Street Reservoir is a Town –owned storm water detention basin which is at the headwater of the Tanyard Brook. This dam has a weir which is controlled by the Department of Public Works. This dam is inspected regularly and there is little chance of any dam failure. Prior to a storm even the weir is lowered to allow the reservoir to empty and then the weir is raised to allow maximum stormwater storage capacity.

Drought
Bristol is susceptible to droughts; however, the Town and the Bristol County Water Authority will coordinate on a local drought management plan which includes public education, local water conservation regulation, and enforcement to manage the water resources so this is not a significant hazard.

Coastal Erosion
Bristol is somewhat susceptible to coastal erosion resulting from storm events and natural erosion. The area of most concern is along Poppoasquash Road where the seawall is in a state of disrepair. The coastal erosion is exacerbated by the blocked culverts under the roadway which cause the road to flood during significant storm events and is undermining the pavement. This area is an evacuation route for the Poppasquash Road peninsula of approximately 100 dwellings and a dozen businesses.

Overall Risk Assessment Summary
The Hazard Risk Assessment demonstrates that the Town of Bristol highest probability of future occurrence of natural hazards to be hurricanes, coastal storms; and, inland flooding.

Table 2. Recent Significant Storm Events in Bristol County

Hailstorms (since 1956) | Floods & Windstorms (since 1993) | Snowstorms (since 1994)

Date	Event	Level or Description	Damages
Jan. 7, 1994	Heavy Snow	Over 7 inches	Roof collapse
Jan. 8, 1994	Glaze	1 inch thick on I-95	$50,000 damage in RI; highway accidents; prolonged power losses
Jan. 7, 1996	Heavy Snow	1 to 2 feet; "Blizzard of 96"	School, store, and business closings; transportation interruption
Jan. 19, 1996	High Wind	63 knots	Scattered power outages; rain and snow melt led to street flooding
Jan. 27, 1996	High Wind	55 knots	N/A
Feb. 2, 1996	Heavy Snow	6 to 8 inches	Transportation difficulties
Feb. 25, 1996	High Wind	70 knots	Snapped utility poles and trees; scattered property damages (roofs)
Mar. 2, 1996	Heavy Snow	6 to 11 inches	Numerous skidding accidents
April 9, 1996	Heavy Snow	Up to 7 inches	Downed trees and lines; power outages
May 21, 1996	High Wind	50 knots	N/A
July 13, 1996	High Wind	64 knots	Minor coastal flooding and beach erosion; urban street flooding
Jan. 10, 1997	Flood	Storm Tidal Surge	Basement flooding; road flooding but no washouts
Jan. 11, 1997	Heavy Snow	4 to 7 inches	Spinouts and minor collisions
Jan. 31, 1997	Freezing Drizzle	N/A	Countless skidding accidents; one death
Mar. 31, 1997	Heavy Snow	1 foot; 60 to70mph winds	Widespread power outages; highway standstill
April 1, 1997	Heavy Snow	Near-blizzard conditions	$700,000 in damage, due to snow removal and power restoration
June 22, 1997	Hail / T-storm Wind	0.75 in. diameter; 70 knots	Swamped boats; tree damage; outages; small fires (lightning)
June 30, 1998	Hail	0.88 in. diameter	Minor flooding of river banks and low-lying areas
Jan. 3, 1999	High Wind	63 knots	Small branches blown down
Feb. 25, 1999	Heavy Snow	Up to 8 inches	N/A

Date	Event	Level or Description	Damages
Mar. 15, 1999	Heavy Snow	7 to 12 inches	Poor traveling conditions; school and business closings
July 25, 1999	T-storm Wind	50 knots	Downed large branches
Feb. 18, 2000	Heavy Snow	3 to 5 inches	Coincided with holiday and school vacation; treacherous driving
Dec. 17, 2000	High Wind	50 knots	Countless reports of downed trees and wires; ferry cancellation(s)
Jan. 20, 2001	Heavy Snow	Up to 8 inches	Minor accidents
Sept. 15, 2002	Heavy Rain	Associated with Tropical Storm Hanna 2.15 inches	Minor flooding due to poor drainage
December 5, 2002	Heavy Snow	Average around 7 inches	None Reported
December 5, 2003	Winter Storm	10-20 inches	Major disruption on transportation due to the combination of poor visibility and snow covered roads.
February 24, 2005	Heavy Snow	8 inches	None Reported
January 22, 2005	Winter Storm	21 inches	Major winter storm, winds gusting to 60 mph at times created near blizzard conditions making travel impossible.
March 1, 2005	Winter Storm	6 inches	None reported
March 8, 2005	High Wind	59 mph gust	$150,000 in property damage
March 28, 2005	Flood	3-4 inches	Significant street and poor drainage flooding $50,000 in property damage
February 12, 2006	Winter Storm	9-14 inches	Blizzard criteria. Broke the previous recorded snowfall. $70,000 in property damage
June 7, 2006	Flood	2-4 inches	Widespread flooding $5,000 in property damage
October 28, 2006	Coastal Flood	2-4 inches	Moderate coastal flooding was reported on Smith Street in Bristol which was covered with 2 feet of water. $2,000 in property damage
March 2, 2007	Flood	2-3 inches	Several roads in Bristol closed due to flooding. Widespread urban and small stream flooding. $5,000 in property damage

Date	Event	Level or Description	Damages
December 13, 2007	Heavy Snow	12 inches	Many motorists were affected as early dismissals from work and school just before snow began created rush hour like conditions which limited the snowplows ability to plow
February 13, 2008	Flood	2-4 inches	Several backyards were under 6 inches of water. Small stream and poor drainage flooding as well as some minor river flooding. In addition there was some minor wind damage from strong northeast winds, especially along the coast.
March 8, 2008	Coastal Flood	2-3 inches	Coastal flooding with water lapping over the seawall.
June 24, 2008	Lightning	Thunderstorms	Heavy rain produced by thunderstorms resulted in flash flooding, hail and damaging winds. A 32 year old man was hit by lightning while fishing on a jetty.
December 12, 2008	Flood	3-5 inches	Silver Creek overflowed its banks flooding Route 114 and other roads in the vicinity, closing these roads. $3,000 in property damage.
December 19, 2008	Heavy Snow	10-11 inches	None reported
March 2010	March 2010 Rain Storms	14.72-16.67 inches	Individual home and business basement flooding, road closures,

Source: National Climate Data Center (http://www4.ncdc.noaa.gov/cgi-win/wwcgi.dll?wwEvent~Storms)

Section 2.4 Population, Property and Economy at Risk

After identifying types and areas of risk, a vulnerability analysis can help to determine the weak points in the community. This assessment examines the vulnerability of the built environment, such as structures, utilities, and roads and bridges, as well as environmental vulnerability. A vulnerability analysis also estimates the number of people exposed to hazards, including elderly population and concentrated populations. This vulnerability assessment includes such things as whether the shelter capacity is sufficient for the affected population, and whether businesses are likely to face temporary closure due to natural disasters. Historical damages are often good indicators for current exposure and potential damage.

How Vulnerable is Bristol?

Evacuation

Bristol is shaped like a lobster claw and as such has two peninsulas that are surrounded by water on three sides. One of peninsulas, which is the Poppasquash area of Bristol, has two egress roads, both of which are located in the velocity flood zone and are at risk for flooding and storm surge. While the structures in the Poppasquash area may not be subject to flooding, the residents are at risk since their evacuation may be impeded. Those residents who remain in their homes are also at risk since emergency vehicles may not be able to reach them if the roads are washed out.

Economic and Social Vulnerability

The Risk Assessment Matrix highlights high risk areas in Bristol and Maps 1 and 2 show the location of most of these areas.

The at-risk population has increased over the years with more development occurring in vulnerable flood areas. In accordance with FEMA requirements, the Town adopted Flood Zoning within the Zoning Ordinance that sets forth requirements for development in flood plain. In 2008, the Town adopted the new FEMA maps that were created as part of the map modernization project along with the required ordinance revisions. The Town also enforces the Rhode Island Building Code which has had special provisions for high wind areas in effect since 1997. Therefore, only newer or recently constructed buildings meet these design criteria. Most of the development in at risk areas, such as Bristol's historic downtown, took place before building regulations required flood proofing construction in flood plains.

Historical and Cultural Resource Areas

Much of the Bristol Waterfront National Register District in downtown Bristol is located within the flood zone. A significant hurricane, with flooding, would impact many of the historic properties within this area. It is important to balance the

mitigation in a manner that is consistent with historical preservation policies and laws.

Shelters

There are two shelters that serve Bristol according to the American Red Cross. The Community Room at Franklin Court serves as a shelter and the Town has an agreement with the Town of Warren to use the Kickemuit Middle School.

Shelter use is not easily predicted because each emergency situation has different variables such as the length of the warning period, official encouragement of the evacuation, public awareness of the location and availability of shelter, and the severity of the approaching hazard. Shelter use may be higher during a storm in the winter, such as an ice storm, since homes would be without heat. Historically shelter use has not been high since residents seek safety at the homes of friends or family or hotels or motels. There are a large number of residents who will also not use the shelters since they can not leave their pets; therefore, shelter for family pets is also an important consideration.

The Silver Creek Manor nursing home is located in the flood plain and they have an agreement with the State to shelter their residents at the Veteran's Home on Metacom Avenue. Residents of Elder Care 1, Elder Care 2; and, the Assisted Living at Franklin Court would not need to evacuate to the shelter since each of these facilities have their own generator. The generators could run necessary equipment if the electricity is out.

Hurricane evacuation notices should be released eight hours before the predicted landfall of the storm. This gives residents plenty of time to seek alternative places to stay rather then riding out the storm in public shelters, minimizing the shelter demand and opening spaces for those really in need.

Public Infrastructure and Emergency Life Lines

There are several public buildings located in the flood plain. In addition to potential structural damage, the access roads for these buildings could also flood during a storm.

- The Everready Fire Station on Thames Street is located in the velocity flood plain and has been flooded during the past.
- The Department of Public Works Garage is located in the flood plain of the Tanyard Brook and is also in an area of poor drainage. This building has flooded during severe rain storm events. The Department of Public Works Facility includes the Town's gasoline pumps which need to remain operational during and after the event so that trucks, snow plows, and emergency vehicles can stay fueled.
- Wastewater Treatment Plant on Plant Street is in the flood plain of the Tanyard Brook and is also in an area of poor drainage. If this building

becomes inoperable there are public health issues and potential pollution to adjacent waterways. In addition to the main treatment plant, there are five (5) sewer pump stations located in flood plains. There are the same public health issues and potential pollution issues if these facilities become inoperable.

There are also several high risk bridges that have utilities underneath them. These bridges have been flooded or washed out in prior hurricanes.

- Town Bridge (Route 114) at Silver Creek, which has been flooded in the past, now carries water and sewer lines that service the north west portion of Bristol. The residents of Bristol, and all the commercial businesses in that area, are vulnerable to destruction of this bridge and the water and sewer lines that run underneath it. Breaks in the sewer line would not only leave residents without sewage disposal, but would also result in raw sewage discharge into Silver Creek. This section of Route 114 was closed during the March 2010 storm event.
- The Bridges at Mill Gut Pond and Mill Pond are also susceptible to flooding. There are utility lines underneath these bridges that serve some of the homes on Poppasquash.
- Tanyard Brook runs under Hope Street (Route 114) and Wood Street, these are major roads with water and sewer lines. This section of Route 114 was closed during the March 2010 storm event.

Repetitive Loss Structures

Repetitive loss properties are those for which two or more losses of at least $1,000 each have been paid under the National Flood Insurance Program (NFIP) within any 10-year period since 1978. According to the information provided by the RIEMA, there are three repetitive loss structures in Bristol. These residential structures are located on the waterfront along the Kickemuit River and are vulnerable to coastal flooding and hurricanes. Proposed Mitigation Action 15 addresses repetitive loss properties.

2.5 The Process of Developing This Hazard Mitigation Plan

Local government officials in Bristol assessed the risks to the Town and developed mitigation actions that address a mix of structural and non-structural initiatives to minimize the vulnerability of the Town to effects from future natural hazards. Those actions are detailed in Section 3.0. Bristol also developed a Risk Assessment Matrix, in Appendix C that summarizes the priority areas at risk from flooding and other hazards.

2.6 Maps

The Town commissioned Beta Group to create two Geographic Information System (GIS) maps for Bristol – one for areas that were listed on the Risk Assessment Matrix and the other for critical facilities in the Town. Map 1 "Flood Risk" includes the properties that would be at risk in the event of a natural hazard event. Map 2 "Flood Risks with Repetitive Loss Areas" shows the population at risk as well as the repetitive loss properties. Map 3 shows the areas of inundation and the critical facilities including the location of the fire and police stations, Red Cross approved shelter and evacuation routes with traffic control points where police will be located to help facilitate evacuation. Both maps also indicate the location of the flood zone boundaries based on the FEMA designated flood zones.

2.7 Capability Assessment

The capability assessment examines the existing plans, programs and policies that the Town already has in place that incorporate hazard mitigation or other protective measures.

The following plans and technical studies were reviewed in the preparation of this Natural Hazard Mitigation Plan:

- The 2003 and 2008 Comprehensive Plan by the Town of Bristol,
- Silver Creek Watershed Study of November 2007 by Beta Group,
- Open Space Plan of June 2008 by the Town of Bristol,
- Tanyard Brook Watershed Study of 2002 by Beta Group;
- Wastewater Facilities Plan of April 2000 and the Facility Plan Reaffirmation of June 2006 by Beta Group; and,
- Poppasquash Road Pedestrian and Bicycle Facility Plan of January 2008 by Pare Corporation.
- Phase II Storm Water Management Program Plan –September 2008

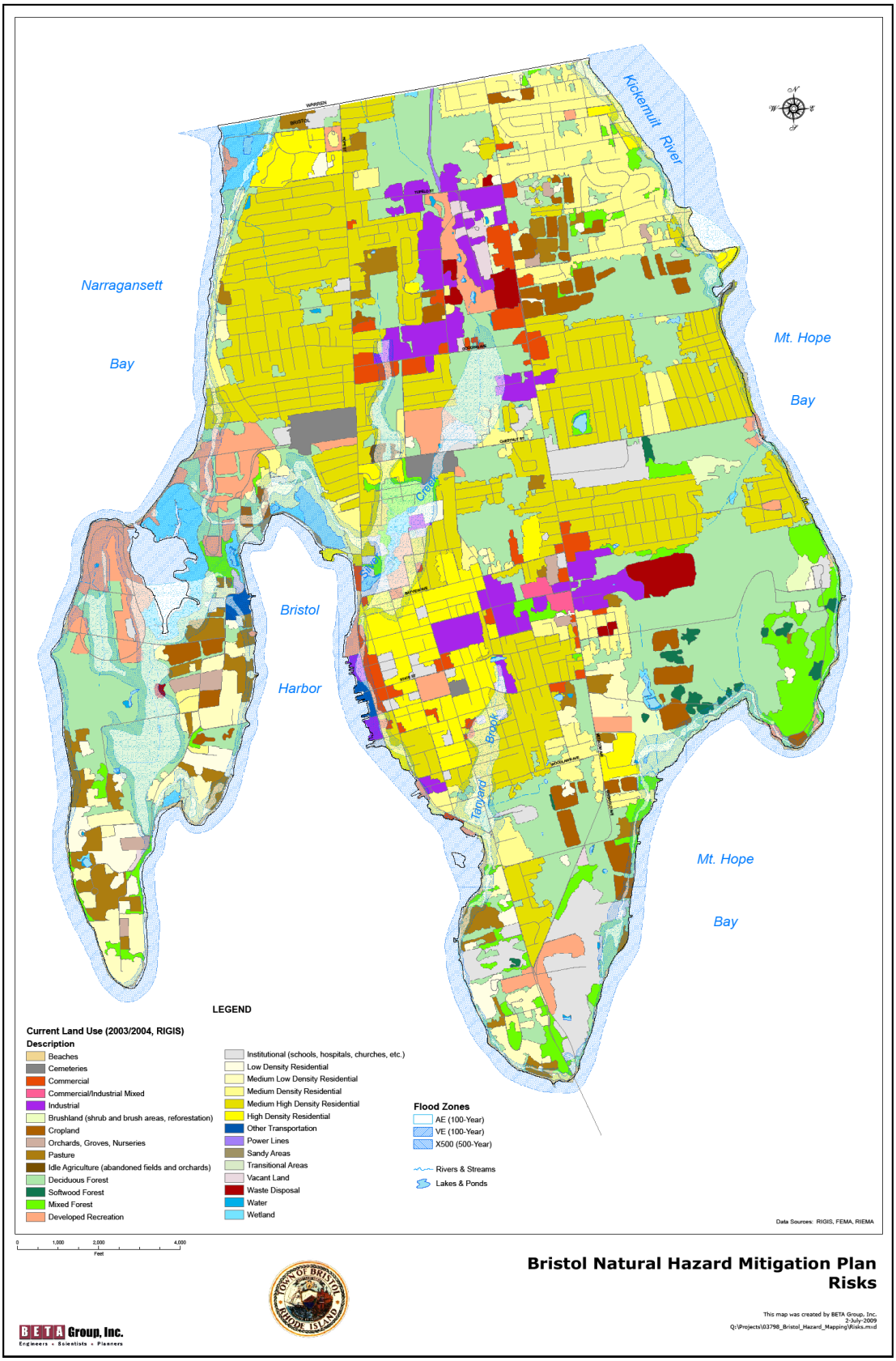
2.8 NFIP Program and Compliance

Bristol implements and enforces the state building code and is fully participates in the NFIP. Bristol does not currently participate in the community rating system (CRS). Bristol has recently begun the steps necessary to become a CRS community which would allow flood insurance policy holders a discount on their premiums. Bristol has supported natural resource management and protection which is articulated in the Comprehensive Community Plan and the Open Space Plan. Bristol has been active in protecting valuable natural open space, which can help minimize flood damage and has recently acquired 6 acres of flood plan and wetlands in the Tanyard Brook watershed. The Town has also adopted and incorporated the requirements from FEMA regarding development in the flood plain into the Zoning Ordinance and has updated the Subdivision and Development Review Regulations to address drainage and properties in the flood plain. The Building Official and Director of Community Development are educated on the current NFIP policies and ordinances. The Town also engages a consultant engineer, who is a Certified Flood Plain Manager, to review applications for building permits to construct in the flood zone. Bristol understands that participation in the NFIP is an essential step in mitigation flood damage and is working to consistently enforce NFIP compliant policies in order to continue its participation in this program.

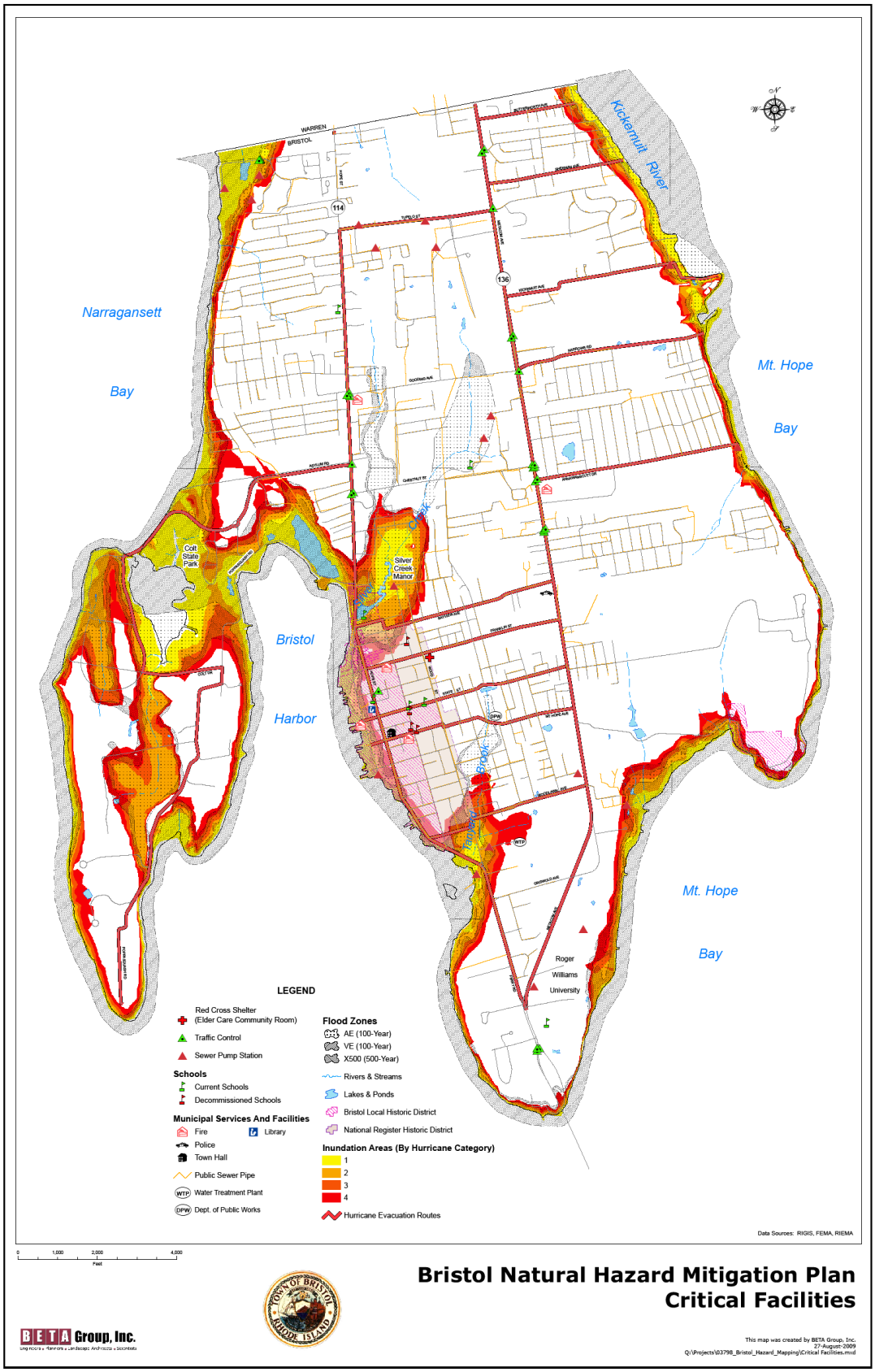
The chart below lists those actions that the Town has done and will continue to do and those actions that will be done within the next five years for continued compliance with the NFIP. *The "To Be Done actions" listed in the chart that follows are listed in order of priority.*

Table 3 Actions for Continued Compliance with NFIP

Actions (Listed in order of priority)	Done/ Ongoing	To be Done
Join the NFIP	X	
Participate in NFIP Training by State and/or FEMA. Bristol is also a member of the RI Flood Mitigation Association and attends the yearly conference.	X	
Establish mutual aid agreements with neighboring communities to address administrating the NFIP following a major storm event	X	
Address NFIP monitoring and compliance activities	X	
Revise/adopt subdivision regulations and erosion control regulations to improve floodplain management in the community	X	
Participate in the CRS	X	
Prepare, distribute or make available NFIP, insurance and building codes explanatory pamphlets or booklets	X	
Identify and become knowledgeable of non-compliant structures in the community		X
Identify and become knowledgeable of submit to rate structures		X
Identify cause of submit to rate structure and analyze how to prevent non-compliant structures in the future		X
Inspection foundations at time of completion before framing to determine if lowest floor is at or above BFE	X	
Require use of elevation certificates	X	
Report any Changes in the Special Flood Hazard Area to FEMA within 180 days of change		X
Identify and keep track of LOMA/LOMR in community	X	
Gain familiarity with community's Flood Insurance Rate Maps	X	
Address repetitive loss structures	X	X


Kickemuit River
Narragansett
Bay
Mt. Hope
Bay
Bristol
Harbor
Mt. Hope
Bay
LEGEND
Current Land Use (2003/2004, RIGIS)
Description
Beaches
Cemeteries
Commercial
Commercial/Industrial Mixed
Industrial
Brushland (shrub and brush areas, reforestation)
Cropland
Orchards, Groves, Nurseries
Pasture
Idle Agriculture (abandoned fields and orchards)
Deciduous Forest
Softwood Forest
Mixed Forest
Developed Recreation
Institutional (schools, hospitals, churches, etc.)
Low Density Residential
Medium Low Density Residential
Medium Density Residential
Medium High Density Residential
High Density Residential
Other Transportation
Power Lines
Sandy Areas
Transitional Areas
Vacant Land
Waste Disposal
Water
Wetland
Flood Zones
AE (100-Year)
VE (100-Year)
X500 (500-Year)
Rivers & Streams
Lakes & Ponds
Data Sources: RIGIS, FEMA, RIEMA
0 1,000 2,000 4,000
Feet
BETA Group, Inc.
Engineers + Scientists + Planners
Bristol Natural Hazard Mitigation Plan
Risks
This map was created by BETA Group, Inc.
2-July-2009
Q:\Projects\03798_Bristol_Hazard_Mapping\Risks.mxd


Narragansett
Bay
Mt. Hope
Bay
Bristol
Harbor
Mt. Hope
Bay
LEGEND
Flood Zones
AE (100-Year)
VE (100-Year)
X500 (500-Year)
Repetitive Loss Area
Bristol Natural Hazard Mitigation Plan
Flood Risks with Repetitive Loss Areas - Map 2
BETA Group, Inc.


Kickemuit River
Narragansett
Bay
Mt. Hope
Bay
Bristol
Harbor
Mt. Hope
Bay
WARREN
BRISTOL
Colt State Park
Silver Creek Manor
Roger Williams University
LEGEND
Red Cross Shelter (Elder Care Community Room)
Traffic Control
Sewer Pump Station
Schools
Current Schools
Decommissioned Schools
Municipal Services And Facilities
Fire
Library
Police
Town Hall
Public Sewer Pipe
Water Treatment Plant
Dept. of Public Works
Flood Zones
AE (100-Year)
VE (100-Year)
X500 (500-Year)
Rivers & Streams
Lakes & Ponds
Bristol Local Historic District
National Register Historic District
Inundation Areas (By Hurricane Category)
1
2
3
4
Hurricane Evacuation Routes
Data Sources: RIGIS, FEMA, RIEMA
Bristol Natural Hazard Mitigation Plan
Critical Facilities
BETA Group, Inc.

CHAPTER 3
Mitigation Actions for Bristol

Removing and precluding development from hazardous areas is the best method of mitigation. However, this cannot be the sole focus of hazard mitigation in Bristol. The Town's character and functionality require a level of intimacy with the areas of greatest hurricane and coastal flooding risks. The opportunity for preclusion has passed, as the Town is nearing build-out, and over forty percent of the population currently resides in a floodplain (including homes in the 500-year floodplain). Furthermore, two of the most prevalent hazards, windstorms and snowstorms, are not easily delineated on the map. Consequently, Bristol's approach to mitigation is primarily comprised of:

A. Informing citizens and business owners how to protect themselves, their property, and their livelihood (and providing resources for doing so whenever possible);

B. Reinforcing and upgrading the town's built environment and municipal systems;

C. Incorporating hazard resilience into the provisions for land redevelopment, with special emphasis on post-disaster recovery and rebuilding; and

D. To the extent feasible, removing repetitively damaged structures from floodplains.

To assist the Town in implementing the recommendations, the action items include the Lead Department and other responsible parties for the particular action, the cost, cost justification; and, financing options and the time frame.

Each of the mitigation items was evaluated using the STAPLEE Method which is a technique for identifying, evaluating, and prioritizing mitigation actions based on existing local conditions.

The action items have been grouped according to type such as education, planning/coordination; and, capital improvement.

STAPLEE METHOD [1]

S – Social — The public must support the overall implementation strategy and specific mitigation actions. Therefore, the projects will have to be evaluated in terms of community acceptance.

T – Technical — It is important to determine if the proposed action is technically feasible, will help to reduce losses in the long term, and has minimal secondary impacts. Determine whether the alternative action is a whole or partial solution, or not a solution at all.

A – Administrative — Under the part of the evaluation criteria, examine the anticipated staffing, funding and maintenance requirements for the mitigation action to determine if the jurisdiction has the personnel and administrative capabilities necessary to implement the action or whether outside help will be needed.

P –Political — Understanding how the current community and State political leadership feels about issues related to the environment, economic development, safety, and emergency management. This will provide valuable insight into the level of political support have for mitigation activities and programs. Proposed mitigation objectives sometimes fail because of a lack of political acceptability.

L – Legal — Without the appropriate legal authority, the action cannot lawfully be undertaken. When considering this criterion, determine whether your jurisdiction has the legal authority at the State, Local level to implement the action, or whether the jurisdiction must pass new laws or regulations. Legal authority is likely to have a significant role later in the process when your community will have to determine how mitigation activities can best be carried out, and to what extent mitigation policies and programs can be enforced.

E – Economic — Cost effective mitigation actions that can be funded in current or upcoming budget cycles are much more likely to be implemented than mitigation actions requiring general obligations bonds or other instruments that would incur long term debt to a community. Local communities with tight budgets or budget shortfalls may be more willing to

[1] (Source: FEMA Local Multi-Hazard Mitigation Planning Guidance July 2008)

undertake a mitigation initiative if it can be funded, at least in part, by outside sources. “Big ticket” mitigation actions such as large – scale acquisition and relocation are often considered for implementation in a post disaster scenario when additional Federal and State funding for mitigation is available

E – Environmental Impact on the environment is an important consideration because of the public desire for sustainable and environmentally healthy communities and the many statutory considerations, such as NEPA, to keep in mind when using Federal funds.

Each of the mitigation actions were scored against each of the STAPLEE criteria outlined above with a numeric score of “1” indicating poor acceptance, a “2” indicating average acceptance and a “3” indicating good acceptance. These numbers were then totaled and developed into an overall priority score. The ranking of the Priority Score is merely a guideline for when the Town should begin acting on the identified strategies, or actions. The highest ranking possible would be a 3 on every criteria or a “21” and the lowest ranking possible would be a “7” with a 1 on every criteria.

The STAPLEE Method includes a cost-benefit review (Component E-Economic) as part of the Mitigation Actions prioritization process. A more detailed cost-benefit analysis will be done, at the time of application, for those proposed Mitigation Actions that the town applies for funding under the Pre-Disaster Grant Program and Hazard Mitigation Grant Program.

Section 3.1 Mitigation Actions

Educational Actions

Action 1: Utilize school curriculum to educate students and their parents about hazard risks

Priority Score - 19
Details: Working in conjunction with FEMA, develop brochures to distribute to the students. Work with the School Department to incorporate hazard risks and prevention into an appropriate school curriculum such as earth science. This could include a program with presentations in classrooms on a yearly basis by local and State Officials

Lead: Town Administrator
Other Responsible Parties: School Department, Town Council, Department of Community Development, State FEMA officials
Cost: minimal
Financing Options: Town Budget; State Grants; and, FEMA Grants
Timeframe: 1-2 years
Cost Justification: Cost of education versus life safety

Action 2: Educational program for residents of flood zones and nearby downstream neighborhoods

Priority Score - 19
Details: Since these properties are in a flood zone, public education and outreach should be ongoing. This would include distribution of maps and literature with information on the evacuation routes and emergency shelter. As part of the education, the Town could post indicators of historic flood levels. An example could be signage on some of the buildings downtown to illustrate how high past flood waters have been. Signage could also be posted on some of the major roadways (i.e Poppasquash Road) to indicate that the area is subject to flooding. This is especially important to include inland areas where the risk is not as obvious.

Lead: Town Administrator
Other Responsible Parties: EMA Director, RIEMA officials
Cost: minimal

Financing Options: Town Budget; State Grants; and, FEMA Grants
Timeframe: 1-2 years
Cost Justification: Cost of education versus life safety

Action 3: Ensure emergency personnel can access people and property within wooded areas

Priority Score - 14

Details: Work with property owners to establish fire lanes in the Mount Hope Area which is the largest wooded area in Town.

Lead: Fire Chief
Other Responsible Parties: Town Administrator , Town Council, Property Owners
Cost: To be determined
Financing Options: Town Budget, State and FEMA grants
Timeframe: 3-5 years
Cost Justification: Cost of coordination with property owners versus life safety

Action 4: Disseminate information on mitigation techniques and hazard insurance.

Priority Score - 19

Details: Distribute literature related to mitigation techniques including the literature from the Institute of Business and Home Safety; retrofit methodology, grant/loan sources, and insurance options.

Lead: EMA Director
Other responsible parties: Department of Community Development and Chamber of Commerce, Downtown Bristol Merchants Association
Cost and Financing Options: Staff time
Time Frame: 1-2 years
Cost Justification: Cost of literature distribution versus life safety

Action 5: Make residents aware of Emergency Response Plan

Priority Score - 21

Details: Steps should be taken to inform residents about which bridges and roads are subject to flooding, as well as about indicators to begin evacuation. Principles of the Emergency Response Plan that are pertinent to given neighborhoods or the population in general should be summarized and distributed. Hazardous locations and warning signs, along with critical phone numbers and evacuation routes, could be conveyed on a calendar, a refrigerator magnet, or some other item commonly displayed in households. Outreach to residents could also be in the form of an annual mailing prior to hurricane season to give

information on property protection and preparedness. Public service messages in the newspaper, on the radio, or during public forums may be a sufficient alternative. Continue to keep the information posted n the Town's website www.bristolri.us and provide a link from the Town's web page to the government web sites including www.riema.gov and www.ready.gov which is tailored to local areas with tips on how to prepare for a hurricane.

Lead: EMA Director
Other Responsible Parties: Town Administrator
Cost: Staff Time plus costs for printing, etc.
Financing Options: Town Budget
Timeframe: 1-2 years
Cost Justification: Cost of public service notice versus life safety

Action 6: Public Information, Outreach – Signage

Priority Score - 21
Details: Post signs that indicate where major access routes are and areas where early evacuation is necessary. This is important not only for the residents but for the general public, including tourists, who may be visiting the area.

Lead: Town Administrator
Other Responsible Parties: EMA Director
Cost: Staff Time plus costs for printing, etc.
Financing Options: Town Budget and FEMA Grants
Timeframe: 1-2 years
Cost Justification: Cost of signage versus life safety

Action 7: Designate Alternative Evacuation Route for the Poppasquash Area through Colt State Park

Priority Score - 15
Details: The Town should seek an agreement from Rhode Island Department of Environmental Management for use of the service road from Poppasquash Road through Colt State Park as a designated evacuation route. This road is located to the west of the former Pearson house and is important for evacuation since it does not cross any waterbodies. Other roads in the Poppasquash area cross bridges at either Mill Gut or Mill Pond Residents should be made aware of this route with signs posted. This is important not only for the residents but for the general public, including tourists, who may be visiting the area.

Lead: Town Administrator
Other Responsible Parties: EMA Director, Colt State Park Director, RIDEM
Cost: minimal
Financing Options: Town Budget and FEMA Grants for signs
Timeframe: 1-2 years
Cost justification: Cost of agreement and signage versus life safety

Planning/Coordination

Action 8: Adopt a "no on-street parking" ordinance that goes into effect with a hurricane warning.

Priority Score - 18

Details: This ordinance would identify streets where on-street parking would be prohibited in the event of a hurricane similar to the parking ban currently used during snow storms.

Lead: Town Administrator
Other Responsible Parties: Town Council, Police Department
Cost: Staff Time
Financing Options: Town budget
Timeframe: 1-2 years
Cost justification: Cost of ordinance versus cost of property damage

Action 9: Develop a debris management program

Priority Score - 17

Details: Fallen debris and tree limbs resulting from thunderstorms, ice storms, and windstorms become fuel for fires in the wooded areas. Prompt removal and clean up of the wooded areas decrease this potential. A comprehensive debris management program will minimize potential impacts.

Lead: Town Administrator
Other Responsible Parties: Department of Public Works REMA and FEMA officials
Cost: To be determined
Financing Options: Town Budget; State Grants; and, FEMA Grants
Timeframe: 3-5 years
Cost justification: Cost of plan development versus life safety

Action 10: Offer a Business Hazard Resilience Audit

Priority Score - 15

Details: Town would hire a specialist or train the building inspector to identify vulnerabilities and appoint a point of contact for offering personalized mitigation advice and distributing useful literature, including notice to property owners about the importance of maintaining the building's systems ;and, the retrofit of basement utilities, if feasible.

Lead: Department of Community Development
Other Responsible Parties: Chamber of Commerce, Downtown Bristol Merchants Association.
Cost and Financing Options: To be determined
Timeframe: 3-5 years
Cost justification: Cost of audit versus cost of property damage and loss of businesses

Action 11: *Prepare an* "After-the-Storm Permitting" Plan for rebuilding

Priority Score - 17

Details: Review the permitting process and prepare a plan to streamline the process in the aftermath of a hazard impact including the process to allow homeowners to retrofit structures in order to reduce risk. The plan should outline a triage procedure for the rush of proposals and requests.

Lead: Department of Community Development
Other Responsible Parties: Town Council, Town Administrator, Planning Board, Zoning Board, Historic District Commission.
Cost and Financing Options: To be determined
Timeframe: 3-5 years
Cost Justification: Cost of plan development versus cost of repetitive losses

Action 12: Explore location(s) for new and/or additional storm shelter(s)

Priority Score - 21

Details: The Town is currently reviewing other buildings that may be more suitable for use as a hurricane and flooding storm shelter however these would likely need to be retrofitted for installation of portable power generators. The need for additional staffing for shelters should also be considered

Lead: EMA Director
Other Responsible Parties: Town Council, Town Administrator, Fire Chief, Police Chief
Cost: To be determined
Financing Options: Town Budget and FEMA Grants
Timeframe: 1-2 years

Cost Justification: Cost of designating additional shelter versus life safety.

Action 13: Retrofit of paved parking areas within the Tanyard Brook and Silver Creek Watersheds

Priority Score – 19

Details: There may be opportunities to include drainage and/or Low Impact Development techniques, such as infiltration strips and reduced pavement, in existing commercial and municipal parking lots that are being resurfaced. A permit process should be implemented to require that resurfacing and expansion of parking lots in the Tanyard Brook and Silver Creek Watersheds are reviewed by the Department of Public Works.
Lead: Department of Public Works
Other responsible parties: Town Council, Department of Community Development
Cost: To be determined
Financing Options: Town Budget, FEMA Grants, private funds
Time Frame: 2-3 years
Cost justification: Cost of retrofitting versus cost of property damage

Action 14: Prohibit new basement utilities or require installation of a grinder pump

Priority Score – 19

Details: Much of the damage from the March 2010 storm event was due to basement utilities backing up, most notably the Bristol County Medical Center. The Town should adopt an ordinance to prohibit new basement utilities or or require installation of a grinder pump between the building and the sewer collection system. . This ordinance should apply to all building spaces constructed below the grade of the street.
Lead: Department of Water Pollution Control
Other responsible parties: Town Council, Department of Community Development
Cost : To be determined
Financing Options: Town Budget
Time Frame: 2-3 years
Cost justification: Cost of ordinance versus cost of property damage.

Capital projects:

Action 15 Eliminate flood risk to repetitive loss properties.

Priority Score – 19

Details: The 3 properties in Bristol that have been repetitively damaged from floods should be retrofitted. The Building Official should determine the appropriate actions to mitigate flood risk to repetitive loss structures.
Lead: Department of Community Development

Other Responsible parties: Building Official
Cost: To be determined
Financing Options: Town Budget, FEMA Grants
Time Frame: 5-10 years
Cost Justification: Cost of retrofitting versus cost of repetitive losses.

Action 16: Acquire properties that are within the coastal flood zones.

Priority Score - 18

Details: The Open Space Plan identifies areas for acquisition that would not only remove properties from the flood zone, but would also satisfy other community objectives; such as, open space, parks and recreation sites; or, scenic areas. One of the best ways to prevent flood damage is to keep flood-prone areas undeveloped. The Town, working with the Conservation Commission as part of the Open Space Plan implementation, will seek to acquire parcels in risk areas as they become available for acquisition.

Lead: Department of Community Development
Other Responsible Parties: Town Council, Town Administrator, Conservation Commission, Department of Public Works, Bristol Land Trust
Cost: To be determined
Financing Options: Town Budget; FEMA Grants; and, State Open-space Grants
Timeframe: 5-10 years
Cost Justification: Cost of acquisition versus loss of property and life safety.

Action 17: Retrofit public buildings especially the Everready Fire Station and the Department of Public Works (DPW) buildings

Priority Score – 15

Details: Refer to the FEMA guide "Floodproofing non-residential structures" to retrofit the fire station and the DPW buildings ; including raising outlets above base flood elevation. Continue agreement with gasoline stations to fuel vehicles when the Town's fuel station at the DPW facility is impacted from flooding.

Lead: Fire Department and Department of Public Works
Other Responsible Parties: Town Administrator
Cost: To be determined
Financing Options: Town Budget and FEMA Grants
Timeframe: 3-5 years
Cost Justification: Cost of retrofitting versus cost of repetitive losses

Action 18: Continue implementation of the Silver Creek Watershed Study.

Priority Score - 18

Details: Implementation of the Silver Creek Watershed Study has begun with the restoration of the Silver Creek Salt Marsh including removing the restrictions from the outfall. The Town needs to continue implementing the recommendations including sediment removal in the salt marsh, providing more upstream detention, and upgrade to the spillway on the north side of Chestnut Street at the High School. The Town recently completed the replacement of the culvert that runs through the St. Mary's Cemetery on the south side of Chestnut Street. .

Lead: Town Administrator
Other Responsible Parties: Department of Public Works, Department of Community Development, Department of Parks and Recreation, Save the Bay, Rhode Island Department of Transportation
Cost: To be determined
Financing Options: Town Budget and FEMA Grants
Timeframe: 1-2 years
Cost justification: Cost of plan implementation versus property damage

Action 19: Repair the Seawall along Poppasquash Road , Restore the culverts under this road at Mill Pond and Mill Gut Pond and repave the road

Priority Score - 15

Details: Implement the findings and recommendations of the Poppasquash Road and Pedestrian and Bicycle Facility Study which includes recommendations to repair the stone wall and restore the culverts. Repaving of the roadway is also needed to maintain this evacuation route.

Lead: Town Administrator
Other Responsible Parties: Department of Public Works, Department of Community Development, Rhode Island Department of Transportation
Cost: To be determined
Financing Options: FEMA Grants and RIDOT Grants
Timeframe: 1-2 years

Cost justification: Cost of seawall repair versus life safety and increased evacuation times

Action 20: Reline or replace sewer lines where necessary

Priority Score - 16

Details: A recent Sewer System Evaluation Study has found areas in town with old, cracked, damaged sewer pipes. The age of some pipes is in excess of 75+ years. The cracked, damaged pipes allow ground water to enter the sewer system increasing wastewater flows in excess of the design of the sewer system. By relining/replacing pipes will reduce infiltration, preventing sewer surcharges, overflows, blockages and backups.

Lead: Department of Water Pollution Control/Compost Facilities
Other Responsible Parties:
Cost: $3,000,000
Financing Options: Town budgets and/or FEMA Flood Mitigation grants, impact fees
Timeframe: 1-2 years
Cost Justification: Cost of replacement versus cost of environmental impacts from overflows

Action 21: Eliminate illegal connections of private sump pumps to the sanitary sewer system

Priority Score - 15

Details: During heavy rain storms the treatment facility, pump stations and sewer system experience heavy wastewater flows in excess of the design of the sewer system causing manhole overflows and sewer backups into residences. Partially caused by sump pumps connected illegally to the sanitary sewer system. A door to door inspection by an independent company has verified connections and the Town has created a GIS mapping of these locations. Notices to property owners to disconnect pumps, with possible solutions and consequences for failure to comply are currently being drafted. Plumbing inspectors can verify that no new connections are being made during construction. Eliminating and preventing such illegal connections would result in reduced manhole overflows, sewer backups and unhealthy situations.

Lead: Department of Water Pollution Control/Compost Facilities
Other Responsible Parties:
Cost: $100,000
Financing Options: Town budgets and/or FEMA Flood Mitigation grants
Timeframe: 1-2 years
Cost Justification: Cost of replacement versus cost of environmental impacts from overflows

Action 22: Upgrade the Mt. Hope Pump Station by Installing Overflow Bypass

Priority Score - 17

Details: During rainstorms excess flows to the Mount Hope Pump Station are greater than the design of the station resulting in manhole overflows to Mount Hope Bay and sewer backups into residences. Replacing existing pumps with new design and more efficient pumps will reduce the possibility of manhole overflows and sewer backups.

Lead: Department of Water Pollution Control/Compost Facilities
Other Responsible Parties:
Cost: $400,000
Financing Options: Town budgets and/or FEMA Flood Mitigation grants
Timeframe: 5-10 years
Cost Justification: Cost of replacement versus cost of environmental impacts from overflows

Action 23: Install an Overflow Bypass at the Wastewater Treatment Plant

Priority Score - 17

Details: During periods of heavy rains, wastewater flows into the Wastewater Treatment Plant is greater than the design of the plant resulting in manholes overflows to Bristol Harbor and sewer backups to residents. The installation of an Overflow Bypass Station will allow the excess flows to be diverted to this bypass structure and pumped independently.

Lead: Department of Water Pollution Control/Compost Facilities
Other Responsible Parties:
Cost: $2,500,000
Financing Options: Town budgets and/or FEMA Flood Mitigation grants
Timeframe: 5-10 years
Cost Justification: Cost of replacement versus cost of environmental impacts from overflows

Action 24: Install an Overflow Bypass up stream of the Silver Creek Pump Station

Priority Score - 17

Details: During periods of heavy rains wastewater flow to this station is greater than the design of the station resulting in manhole overflows to Bristol Harbor and sewer backups to residences, nursing homes, and businesses. The installation of an Overflow Bypass Station will allow the excess flows be diverted to this bypass structure and pumped independently with its own force main to the Wood Street sewer line. This should reduce manhole overflows and backups.

Lead: Department of Water Pollution Control/Compost Facilities
Other Responsible Parties:
Cost: $4,000,000
Financing Options: Town budgets and/or FEMA Flood Mitigation grants
Timeframe: 3-5 years
Cost Justification: Cost of replacement versus cost of environmental impacts from overflows

Action 25: Concrete/ earthen berm to protect Wastewater Treat Plant above base flood elevation

Priority Score - 12

Details: This wall would serve as a dam to keep the flood waters out of the wastewater treatment plant.

Lead: Water Pollution Control Department
Cost: To be determined
Financing Options: Town Budget and/or FEMA grants
Timeframe: 5-10 years
Cost Justification: Cost of protection versus cost of environmental impacts from overflows

Action 26: Priority Cleaning Plan for Sewer Lines

Priority Score - 19

Details: Over the next five years, beginning in 2009, all sewer lines must be cleaned and camera inspected.

Lead: Water Pollution Control Department
Cost: To be determined
Financing Options: Town Budget and/or FEMA grants
Timeframe: 5-10 years
Cost Justification: Cost of cleaning versus cost of environmental impacts

Action 27: Continue implementation of the Tanyard Brook Watershed Study

Priority Score - 18

Details: The recommendation of Beta Group, the Town's consultant for the Tanyard Brook Watershed Study, is to install a new culvert, install a tide gate at the outfall; and, expand the capacity of the State Street Reservoir. The current culvert is under capacity and higher then the adjacent grade at some areas. This creates serious local flooding during rain events. The new culvert has been designed in accordance with the recommendations of the study and Phase 1 of the project has recently received permits from the RI Department of Environmental Management and the RI Coastal Resources Management Council.

Lead: Department of Community Development
Other Responsible Parties: Town Council, Town Administrator, Planning Board
Cost: $7,000,000
Financing Options: Town Budget, Bond Referendum and FEMA Grants
Timeframe: 1-2 years
Cost Justification: Cost of plan implementation versus cost of property damage and life safety.

Action 28: Bury electrical wires and other suspended cables

Priority Score - 11

Details: Continue the requirements for subsurface utility lines in new subdivisions. On existing streets in the downtown, and along Poppasquash Road, the above ground utilities should be placed underground. Although not financially feasible at this time; it should be considered in the future, especially if the Town is eligible for federal disaster assistance after a storm event.

Lead: Town Administrator
Other responsible parties: Planning Board, National Grid
Cost: To be determined
Financing Options: FEMA grants
Timeframe: 5-10 years
Cost Justification: Cost of underground utilities versus cost of property damage and life safety from downed utility lines.

Action 29: Reinforce wire-to-pole connections

Priority Score - 12

Details: While Action 28 above, is a long term implementation item, in the short term, the wires on the poles in the downtown area, particularly along Hope Street, should be secured to the poles with "Hendrick's Spacer Cables". These spacer cables make the wires more durable, improve the reliability of service to customers; and protect the health of the street trees, making them less susceptible to storms.

Lead: Town Administrator
Other Responsible parties: National Grid
Cost: To be determined
Financing Options: FEMA Grants
Timeframe: 3-5 years
Cost Justification: Cost of underground utilities versus cost of property damage and life safety from downed utility lines

Action 30: Inspect and repair the seawall along Independence Park and Walley Beach as necessary

Priority Score - 17

Details: Stability of the seawall should be evaluated. Repairs and regular maintenance should be made when necessary to enable it to withstand a 20-to 50-year storm.

Lead: Department of Public Works
Other Responsible Parties: State Department of Transportation
Cost: to be determined
Financing Options: Town Budget, FEMA Grants, and RIDOT Grants
Timeframe: 3-5 years
Cost Justification: Cost of inspection and repair versus cost of property damage

Table 4 Mitigation Actions

Action	Priority Score	Description
5	21	Make residents aware of Emergency Response Plan
6	21	Public outreach via signage
12	21	Explore locations for new and/or additional storm shelters
1	19	Utilize School Curriculum for education
2	19	Education for residents
4	19	Disseminate information mitigation techniques
15	19	Eliminate flood risk to repetitive loss properties
24	19	Priority Cleaning Plan for Sewers
13	19	Retrofit Parking Lots
14	19	Prohibit basement utilities or require grinder pumps
8	18	No on-street parking with hurricane warning
16	18	Acquire properties that are within the coastal flood zones
18	18	Implement the Silver Creek Watershed Study
27	18	Implement recommendations of the Tanyard Brook Watershed Study
9	17	Create a Debris management plan
11	17	Create a “redevelopment plan” for re-building
22	17	Upgrade Mt. Hope Pump Station
23	17	Install an Overflow Bypass at the Wastewater Plant
25	17	Install an Overflow Bypass upstream of Silver Creek Pump Station
30	17	Inspect and Repair the Seawall of Independence Park and Walley Beach.
20	16	Re-line or replace sewer lines where necessary
7	15	Alternate evacuation route for Poppasquash Road
17	15	Retrofit Public buildings
10	15	Business Hazard Resilience Audit
21	15	Eliminate illegal connections of sump pumps
19	15	Repair the Seawall and culverts along Poppasquash Road
3	14	Ensure access to wooded areas
25	12	Install a concrete/earthen berm to protect Wastewater Treatment Plant
29	12	Reinforce wire to pole locations
28	11	Bury Electrical wires

3.2 Coordination with Local Business Community

The Town has coordinated with the local business community during the preparation of this plan. The Bristol County Medical Center was provided a copy of the draft plan and offered an opportunity to comment. he Thames Street Landing development on Thames Street is located within a 100 year flood plan and velocity flood plain. They have provided a copy of their lease agreement and hazard mitigation strategy to use as a model for other local businesses in the Bristol downtown (See appendix D). As a condition of the Town's approval for the project, the developers have agreed that the ground floor stores will not be leased to any businesses that would sell large objects such as appliances. These items would be difficult to get out of the store prior to the storm and would become projectiles during a flood event. The lease agreement provides a storage area, located out of the floodplain, for each of the stores. Additionally, there is an arrangement with a local moving company to assist the store owners with transporting their goods to a safe and secure location until the storm event is over. This helps to reduce the amount of property lost and also allows the store owners to reopen their businesses quickly following an event. Bristol will also secure agreements with local businesses, such as gas stations, to provide gasoline to necessary vehicles during a storm since the Town's Department of Public Works may be inaccessible due to its location in a flood plain.

3.3 Coordination with Neighboring Municipalities

The Town of Bristol coordinates with the Town of Warren as evidenced by the agreement with Warren to use the Kickemuit Middle School as a storm shelter. The Town will continue to coordinate with Warren on natural hazard mitigation planning.

3.4 Incorporation into Existing Planning Mechanisms

The Bristol Hazard Mitigation Committee has drafted mitigation actions to address the Town's risks and vulnerabilities and has recommended that they be implemented into the appropriate elements of the Comprehensive Plan. The Comprehensive Plan is a planning document that outlines goals, policies, issues and actions to provide a framework for growth within the Town. In September 2008, the Town adopted an updated Comprehensive Plan, which includes many of the mitigation actions included in this natural hazard mitigation plan. Additionally, the Planning Board will integrate this document into the Comprehensive Plan upon State and Federal Approval and local adoption.

Hazard mitigation is also linked through the other Town planning documents including the Comprehensive Plan, the Open Space Plan, the Subdivision and Development Regulations; and, the Phase II Storm Water Management

Program Plan. The following table lists references related to hazard mitigation from these documents.

Document	***Hazard Mitigation Actions***
Comprehensive Plan	*Land Use Element* • Action Item LU8 – Continue to protect the Silver Creek and Tanyard Book Watersheds • Action Item LU9 – Implement the Silver Creek Watershed Drainage Study and the recommended Tanyard Brook improvements. *Homes and Neighborhoods Element* • Policy C of Goal 3 – The Town will pursue federal and/or state funds to purchase flood prone properties • Action Item H&N30 – Stress that residential and other development in any flood zone continue to be compliant with FEMA regulations, CRMC, DEM Regulations and any Bristol Town flood hazard zone regulations. *Economic Development Element* • Action ItemED31 – In conjunction with the recommendations of the Town's Hazard Mitigation Plan, consider public monies to assist in financing the demolition of some parts of the buildings along the waterfront that would make public access more feasible and reduce obstruction and bulk along the waterfront *Services and Facilities Element* • Action Item SF6 – Move forward with the recommended improvements for the Tanyard Brook and State Street Reservoir. See Federal and State Grants to augment funding of this project to supplement the bond. *Open Space, Conservation and Recreation Element* • Action Item OSCR11 – Require Best management practices to preserve wetlands, flood plains and other environmentally sensitive areas. *Natural, Historical, Cultural Element* • Action Item NHCR8 – Use federal, state and local programs to purchase properties that are subject to frequent flood or storm damage.
Open Space Plan	*"Open space acquisition efforts in the area of the Silver Creek Watershed should be focused on watershed protection, marshland habitat preservation, and* ***storm water mitigation /flood control****."* *"Wooded wetlands adjacent to the (Tanyard) brook in the Woodlawn Avenue and Wood Street areas should be protected for habitat and flood control purposes."*
Subdivision and Development Review Regulations	*Design and Construction Standards* *B(2)c "The following specific areas shall be preserved as undeveloped open space or lot area….. ii. Undeveloped lands in the flood plain, especially velocity flood plain…"*

	Article 6.6 Impact Statements A. Environmental Impact Statement (3) An EIS required .. shall be prepared by a qualified professional and shall include research and documentation describing and assessing short and long-term cumulative environmental impacts, which may include impacts to Flooding and drainage (b).”
Phase II Storm Water Management Program Plan	*“The Town will develop a predictive catch basin and structural Best Management Practice (BMP) program within the first two years of the program.”* *“The Town will inspect/clean all catch basins, manholes and structural BMP’s annually by the third year of the program unless determined by the Predictive Catch Basin Program that a lesser frequency is required.”* *“The Town will continue to clean all of the streets at least once per year for the duration of the plan.”*

Chapter 4
Implementation Schedule

Section 4.1 Strategy Adoption

The Plan will be approved and adopted by the Bristol Town Council upon receipt of preliminary approval from the Rhode Island Emergency Management Agency and the Federal Emergency Management Agency.

Section 4.2 Monitoring, Evaluating and Updating the Plan

The plan is a living document that requires adjustments to maintain its relevance. The Bristol Hazard Mitigation Committee will meet annually to review the status of the mitigation actions; and provide a yearly status report to the Town Administrator. It is recommended that this review be conducted prior to the Town's annual budget process so that any locally funded projects can be considered in the budget process. The plan will be reviewed and updated every 5 years using the same process as the initial plan adoption with public workshops and public hearings. It is the goal for the first update of this plan to incorporate those optional requirements of the FEMA Local Multi-Hazard Mitigation Planning Guidance, July 2008 in an effort to increase the CRS points that the Town can receive from having a Natural Hazard Mitigation Plan. The Town has recently commenced the CRS process with a meeting and a building permit file review conducted by the Local Flood Plain Manager.

The Bristol Hazard Mitigation Committee will utilize the August 2003 FEMA How-to Guide "Bringing the Plan to Life/Implementing the Hazard Mitigation Plan" as a resource document to update this plan. This guide contains worksheets which will help the Committee evaluate and monitor the results of the mitigation actions.

The Bristol Hazard Mitigation Committee will also identify potential mitigation projects that can be implemented in a post-disaster scenario taking the opportunity to improve Bristol's disaster reliance.

Section 4.3 Continued Public Involvement

Bristol will continue public involvement in the plan maintenance process by:

a. The approved/adopted plan will be posted on the town's web site;
b. The annual meeting of the Bristol Hazard Mitigation Committee to review the implementation of the Plan is a public meeting and will be posted per town guidelines.
c. The Bristol Hazard Mitigation Committee will include the public in the preparation of the five-year Plan Update using the same public participation process as in the development of this plan.