Town of Rehoboth

Community Resilience Building Workshop

Summary of Findings

May, 2018

FUSS & O'NEILL

Project No. 20170390.E50

FUSS & O'NEILL

Town of Rehoboth

Community Resilience Building Workshop

Summary of Findings

Overview

Extreme weather and natural and climate-related hazards are an increasing concern for the communities of Massachusetts, and there is a clear need to involve municipalities, corporations, organizations, and the State in increasing resilience at all levels. Recent storm events affecting the region have highlighted many of the vulnerabilities that towns and cities face. Hurricane Irene and Superstorm Sandy brought intense flooding to many municipalities and threatened (or destroyed) infrastructure across the state. Extreme temperatures at both ends of the spectrum have pushed the limits of communities' preparedness to protect both infrastructure and people. In coastal communities, the impacts of sea level rise are felt daily and further exacerbate the impacts of other extreme events. Current climate modeling indicates that all of these hazards are expected to increase in frequency and scale over the coming decades. The Municipal Vulnerability Preparedness (MVP) program provides support and a prescribed process for cities and towns in Massachusetts to plan proactively for resiliency and implement key climate change adaptation actions.

In 2017, the Town of Rehoboth was awarded a $15,000 MVP grant to fund the planning stage of this process. The Town partnered with Fuss & O'Neill, a state certified MVP Provider, to complete a comprehensive, baseline climate change and natural hazard vulnerability assessment and develop a list of priority actions for the Town. This process involved the development of an MVP Core Team, which met on March 12, 2018 to determine initial concerns and worked to identify stakeholders within the municipality and set goals for the process. Those stakeholders were then invited to participate in a Community Resilience Building (CRB) workshop on May 10, 2018, engaging in a day-long, tried and tested process developed by The Nature Conservancy. The CRB methodology is an "anywhere at any scale" format that draws on stakeholders' wealth of information and experience to foster dialogue about the strengths and vulnerabilities within the Town. Workshop participants interacted at both large and small group levels, using an iterative process to gather input, synthesize ideas across groups, and ultimately develop a set of priority resilience and adaptation actions.

The CRB workshop's central objectives were to:

- Define top local natural and climate-related hazards of concern;
- Identify existing and future strengths and vulnerabilities;
- Develop prioritized actions for Rehoboth;
- Identify immediate opportunities to collaboratively advance actions to increase resilience.

Top Hazards and Vulnerable Areas

During the Community Resilience Building workshop, participants were asked to identify the top four natural hazards of concern for the Town of Rehoboth. Discussion of the top hazards built on earlier conversations that took place at the MVP Core Team Meeting, as well as Town conversations that have formed the basis for the Town's Hazard Mitigation Planning. Impacts of extended drought, such as those seen during summer 2016 were identified as one of the Town's top hazards. Flooding was identified as a second hazard. Severe storm events were identified as a third hazard. Finally, the impacts of wind were seen as a fourth major hazard. These four hazards have already had demonstrated impacts on the Town, and as climate change progresses, these hazards are expected to have ever greater consequences for infrastructure and environment, as well as for various societal elements. Specific areas of concern are identified below.

Top Hazards

- Drought
- Floods
- Severe Storms
- Wind

Areas of Concern

While many impacts are expected to be felt Town-wide, certain elements, locations, or community groups present particular concerns.

Neighborhoods/Communities
Residents on private water, seniors, vulnerable populations

Ecosystems
Redway Plain, Rehoboth State Forest, Palmer River watershed

Infrastructure
County Street Bridge, Route 44 bridge, Danforth Street Culvert, private wells

Current Concerns and Challenges Presented by Hazards

Major storm events have been a recurring threat to Rehoboth throughout its history, from hurricanes bringing wind, intense precipitation, and localized flooding, to winter storms delivering ice and snow. Notable historic events include impacts from the Great Hurricane of 1938. Much more recently, Town officials in Rehoboth note that the Town has been experiencing an increase in the frequency of 100 year storms. March of 2018 brought major storms that are fresh in the Town's memory. From March 2nd to 14th, up to 85% of the Town had no power at one point or another, the fire department had to pump water out of houses, 32 roads were closed down due to flooding, and drinking water was being imported due to the inability of private wells to operate without electricity.

Intense storms have become increasingly problematic for the Town, in large part because storms now tend to bring a combination of precipitation types (ice, rain, and snow) and other impacts (wind) all in one storm event. This complicates the effort to maintain access and provide services. Extreme temperatures at both ends of the spectrum have also posed occasional challenges for Rehoboth, especially for the Town's more vulnerable populations.

While excess water is an obvious problem, too little water is equally concerning. As with the rest of the Commonwealth, Rehoboth experienced a major drought in 2016. There is concern in the Town regarding groundwater supply, both for public water supply and for private wells. Supply could increasingly become an issue as climate change progresses and extreme heat and drought become more common.

Specific Categories of Concerns and Challenges

Infrastructural

Culverts and Bridges

Culverts and bridges are recognized as a potential concern town-wide. Workshop participants noted, in particular, that the County Street Bridge is in need of repair, and the Town has applied for a Mass Department of Ecological Restoration culvert grant to replace the culvert that conveys the West Branch of the Palmer River under Danforth Street. There is also a new bridge that Mass DOT replaced on Route 44 which has drainage issues. Regardless of condition, culvert and bridge structures were designed to accommodate historic patterns of precipitation and runoff, which are rapidly transforming as a result of climate change. As precipitation events become more intense and less predictable, undersized culverts are expected to pose a greater threat of failure and flooding.

Drinking Water Supply

Town officials expressed some concern over the need to increase water supply resiliency to ensure adequate supply during longer droughts, which are expected to increase as a result of climate change. There is concern that runoff is leaving the groundwater recharge area and therefore not refilling groundwater supplies. There is also concern over contamination from pesticide runoff, particularly associated with operations such as golf courses.

Municipal Separate Storm Sewer System (MS4)

The Town's MS4 system is seen as a potential liability, both in terms of responding to and being in compliance with the new MS4 permit, and in terms of allocating sufficient maintenance funds to prevent flooding problems associated with climate change and hazard events.

Environmental

Trees and Forests

Forests provide critical ecosystem services that help buffer the effects of climate change, from sequestering carbon, to increasing groundwater recharge, to modulating local temperature. Street trees are likewise critical for infiltration of rainwater and provision of shade. However, trees and forests are also threatened by climate change. Wind and storms cause blowdowns, drought can contribute to die-off, new invasive pests (e.g., Emerald Ash Borer, Asian Longhorned Beetle) are eliminating certain tree species, and others are in decline due to shifting temperature and precipitation regimes that favor more southerly species. In Rehoboth, forest management is also linked to concerns over wildfire risk, which is increased by the build-up of fuel that results from die-offs and is further exacerbated by drought and extreme heat. Redway Plain, a historic property, and the Rehoboth State Forest are particular areas of concern.

Pests and Disease Control

Climate change is affecting pests and disease vectors both through changing precipitation conditions and changing temperature conditions. Warmer, wetter conditions lead to increased mosquito populations, while the absence of sufficient periods of cold means that pest populations that would historically have been killed off or reduced are able to survive the winter and emerge in greater numbers the following season. Further, as the Massachusetts climate begins to look more like the climate of the mid-Atlantic and southern states, we are seeing new types of diseases show up in existing pests (e.g. mosquitoes carrying West Nile Virus or Zika and ticks carrying Rocky Mountain Spotted Fever). These changes present a major public and animal health challenge in terms of education, prevention, and treatment.

Open Space

Open space provides ecosystem services that help buffer the effects of climate change, from sequestering carbon, to increasing groundwater recharge, to modulating local temperature. Open space is also critical in floodplains for providing a buffer and increased flood storage, near public water supplies to maintain high water quality and promote recharge, and to maintain overall habitat connectivity that will be vital to allowing ecosystems and individual species to adapt to a changing climate.

Invasive Species

Invasive plants and animals are already a source of concern in Rehoboth, as they are throughout the Commonwealth. Forest and upland ecosystems are threatened by a variety of invasive plants, including plants such as oriental bittersweet, multiflora rose, and several non-native honeysuckles. Riparian and aquatic habitats are severely threatened by common reed, Japanese knotweed, invasive water chestnut, hydrilla, purple loosestrife, and Eurasian milfoil. Critical invasive insect pests already in the area include the Asian Longhorned Beetle and Emerald Ash Borer, both of which have the potential to do serious damage (both environmental and economic) to Massachusetts' forests and trees. These and other species already pose a significant challenge and have serious consequences for ecosystem health and resilience, and these impacts are likely to increase in response to climate change. Warming temperatures will also bring new invasives to the area, and these will have an easier time gaining a foothold if the Town's natural ecosystems are simultaneously weakened due to changes in climatic conditions.

Societal

Local Regulations

There was recognition among workshop participants that regulations are outdated and therefore insufficient to address climate change risks. The Town sees a need for revised regulations that pertain to groundwater recharge, well protection, and stormwater management.

Vulnerable populations

Workshop participants acknowledged the challenges of identifying and reaching vulnerable individuals, especially those who may no longer have a land-line telephone, or who may not self-identify as vulnerable. Certain populations, especially seniors, are known to be at higher risk during hazard events and may require support beyond emergency notifications. Workshop participants expressed concerns about these populations' ability to obtain food and medical supplies during hazard events, as well as the challenges involved in getting seniors to leave their homes (and sometimes their pets) in order to seek shelter elsewhere. Additionally, power outages can be threatening for senior citizens who use respirators or rely on other electrically-powered equipment. Better understanding what these needs are and how the Town can best prepare to proactively support its entire population are areas that require more exploration.

Stress on Emergency Services

Rehoboth's Fire and Police departments bear much of the burden of responding to the increased human threats that result from climate-induced hazards. In order to provide those services, however, an ever larger percentage of the departments' time and resources are being devoted to efforts to keep roads passable after storms and wind create blockages. In addition, Rehoboth's emergency services are being used to transport vulnerable individuals during hazard events, and this is not sustainable.

Town Hall

The Town Hall was built in 1956 as a Nike Missile Site, and acquired by the Town in 1971. The Town has been trying since the late 1990's to raise funds for a new Government Complex that would serve as an emergency command center and shelter, housing Town Hall, Police, Fire, Ambulance, REMA, and the

Building Department. The new facility would be resilient to power outages, water supply problems, floods, etc., would be centrally located, and would increase the Town's ability to facilitate emergency response during hazard events.

Current Strengths and Assets

While the Town recognized a number of vulnerabilities, workshop participants identified key strengths as well. Rehoboth benefits from a number of relationships that increase the Town's resilience, particularly in terms of supporting its agricultural community and providing support in combatting mosquitoes and related disease.

- The Town has existing data on private well drilling reports for approximately 4,100 wells.
- The Town is part of the Bristol County Mosquito Control District, which provides both spraying and brush cleanup services to limit mosquito populations.
- Climate change is driving water conservation efforts among the agricultural community.
- The Town benefits from education and outreach provided by Mass Department of Agricultural Resources (MDAR) and Board of Health, particularly related to manure management.
- The USDA and MDAR both serve as resources for the Town and its agricultural community.
- Rehoboth State Forest is an open space asset for the Town.
- Rehoboth has an informed and active agricultural network.
- Rehoboth's farmers produce local produce that contributes to the Town's ability to build a resilient food supply, though farms can also face threats from climate change.
- The Town is benefiting from a recent MDAR grant related to manure management in the Palmer River Watershed.

Top Recommendations to Improve Resilience in Rehoboth

Participants at the CRB workshop identified a number of recommendations to address vulnerabilities and increase resiliency in three main topic areas: infrastructure, environment, and society. Management of water, primarily dealing with excesses of water due to isolated flooding, was a primary concern that emerged in both the small and large group discussions, as was maintaining sufficient, safe water supply during drought or other hazards. A second theme centered around providing emergency services to the Town's residents during hazard events, with particular attention to vulnerable populations.

Highest Priority

- Conduct comprehensive study of water resources, including groundwater studies and drought assessment and a field inventory of culverts and bridges to rank and prioritize projects for increased flooding resiliency and storm-hardening, followed by design and implementation of priority re-sizing or replacement projects. Green infrastructure, Low-Impact Design, and other nature-based solutions will be integrated with hard-infrastructure improvements to establish approaches that will be robust in the face of natural hazards and climate-change scenarios. Known problem areas, such as the County Street Bridge, Route 44 Bridge, and Danforth Street Culvert, should be areas of focus. The study should build off of existing data and information already existing in the Town.

- Pursue public facilities upgrades that would increase resiliency, including construction of a new Government Complex that is resilient to power outages, water supply problems, floods, etc., and is centrally located. The new facility should include multiple Town departments including all emergency response services.

- Conduct robust education and outreach to build awareness of town resources and make Town residents aware of the many planning efforts, procedures, shelters, evacuation plans, etc. which are focused on making the Town more resilient to climate change impacts. Ensure that all residents know how to access these resources when they are needed. Focus especially on flood prone areas.

- Develop a more robust communications system to inform the public prior to hazard events and disperse updates during hazards. Communications should include issues related to water supply, road closures, evacuation routes, and shelter information.

- Develop transportation planning for vulnerable populations during hazard events to ensure that vulnerable groups, notably seniors, will be able to get to shelters, obtain food and medications, or receive emergency services. Focus should be on identifying vulnerable populations and providing aid during all types of climate-induced risks, such as extreme temperatures, increasingly intense storms which may make travel difficult, or flooding and storm events that may leave residents unprepared, stranded, or cut off from supplies. Transportation should not depend on emergency services personnel, as is currently the case.

- Review and revise Town regulations pertaining to stormwater management, groundwater recharge, and well protection in order to increase resiliency, ensure that regulations

accommodate and encourage nature-based solutions, and provide legal authority to enforce protective measures.

- Coordinate with Mass DOT to develop a fix for the drainage issues in the vicinity of the new Route 44 Bridge.

- Establish a system for sharing real time information regarding road closures and emergencies that is GIS based. The Town is working on this with MEMA, but the project needs a local champion.

Moderate Priority

- Develop a neighbor-to-neighbor program to facilitate identification of and support for vulnerable populations and promote assistance between neighbors.

- Provide public education and outreach to private well owners, focusing on conservation measures and means of limiting water use to prevent impacts to the water supply.

- Purchase an emergency message board utilizing Chapter 90 funding to provide a means of distributing emergency information to residents.

- Improve communication with Rehoboth State Forest managers to gain access to information on the forest management plan, ensure maintenance of fire access roads, and understand what is being done to manage pests and disease that threaten the forest.

Lower Priority

- Compile and analyze private well drilling reports to make better use of existing records and information documenting private wells.

- Develop funding sources for agricultural community to pursue new technologies and water reuse techniques that will further increase water conservation.

CRB Workshop Participants

All workshop invitees are listed below; attendees are indicated with an asterisk.

Name	Position/Organization
Helen Dennen*	Town Administrator
William Maiorano*	REMA Director
Linda Sherman*	Director/ Council on Aging
Karl Drown*	Health Agent/ Board of Health
Michael Costello*	Superintendent of streets/ Highway Department
James Muri*	Selectman
Steven Howitt	State Representative, 4th Bristol District
Paul Feeney	State Senator
Anthony Azar	Superintendent/ DR Regional
Gerry Schwall*	Vice Chair/ Board of Selectman
William McDonough	Interim Building Commissioner and Zoning Officer
Ryan DuVally	Zoning Board of Appeals
Rob Johnson	Assistant Animal Control Officer
Richard J Panofsky*	Animal Advisory Committee
Carolyn Panofsky*	Chair/ Green Energy Committee
Christopher Cooper	Member of Planning Board
Dave Evans	Chair/ Conservation Commission
Ed Bertozzi*	Vice Chair/ Planning Board
E Otis Dyer	Resident
James Trombetta	Chief of Police
Scott Meagher	Chief Rehoboth Ambulance
John Jordan	Board Member/ Rehoboth Business Association
Linda Ferraira	Vice President/ Rehoboth Business Association
Carol Williams	Chair/ Community Preservation Committee
Dave Janik*	MA Coastal Zone Management
Jaime Conlon*	Public Health Nurse
Adam Latham	President/ Rehoboth Land Trust
Cornelius Harrington*	Council on Aging Board
John Hermance	Professor Emeritus/ Brown University
Jim Whitehead	Lead Energy Efficiency Consultant/ National Grid
Timothy Johnson	Resident
Luke Travis	Attorney/ Bristol Legal
John	Souza Family farm
Skip	Homestead Farm
Tish Vadnais	Planning Board
Robert Davis	President/ Insite Engineers
John Janke	Store Manager/ J&J Materials
Chuck P	NE-CB
George Cardono	Park Commission, Rehoboth Housing Authority
June House	Clerk/ Community Preservation Committee
Valerie Souza*	Chair/ Agricultural Commission

Citation

Fuss & O'Neill (2018). Community Resilience Building Workshop Summary of Findings. Town of Rehoboth, Fuss & O'Neill, Inc. Rehoboth, Massachusetts.

CRB Workshop Project Team: Organization, Name, Role

Name	Organization	Role
Helen Dennen	Town Administrator	Project Coordinator/Core Team Member
LeeAnn Bradley	Planner, Conservation Agent	Core Team Member
Linda Sherman	Council on Aging Director	Core Team Member
William Maiorano	REMA Director	Core Team Member
Karl Drown	Health Agent/ Board of Health	Core Team Member
Michael Costello	Superintendent of Streets/ Highway Department	Core Team Member
Steven Howitt	State Representative, 4th Bristol District	Core Team Member
Mary Monahan	Fuss & O'Neill	MVP Lead Facilitator
Shawn Martin	Fuss & O'Neill	Facilitator/Scribe
Tom Collins	MTC OPS, LLC	Facilitator

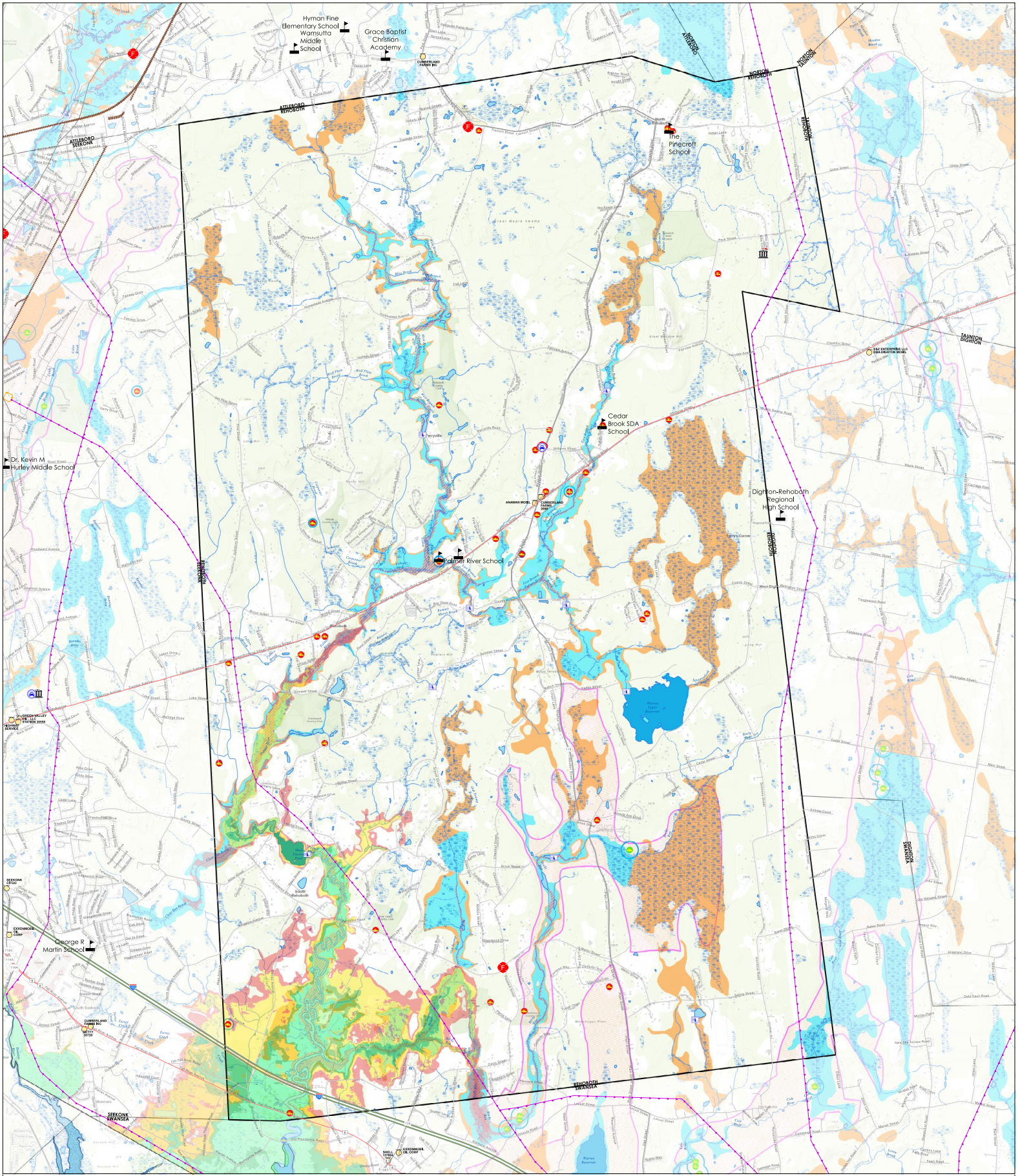
Acknowledgements

Many thanks to the MVP Core Team members, CRB workshop participants, and to Helen Dennen who acted as the local Project Coordinator. Thanks to LeeAnn Bradley who coordinated the Core Team Meeting. Thanks to the Town of Rehoboth for providing a meeting space for the Core Team Meeting and CRB Workshop and coordinating the CRB Workshop. Thanks in advance to James Muri who will be serving as the MVP coordinator going forward.

Funding for the CRB Workshop was provided through a Massachusetts MVP grant.

Appendix A

CRB Workshop Base Map



- Town Hall
- Police Station
- Fire Station
- School
- Community Groundwater Source
- Surface Water Intake
- Non-Community Groundwater Source
- Underground Storage Tanks
- Dams
- Railroads - Active Service
- Powerline
- Substation
- Perennial Stream
- Intermittent Stream
- Shoreline
- Intermittent Shoreline
- Manmade Shoreline
- Ditch/Canal
- Pond, Lake, Ocean
- Reservoir
- Wetland
- Salt Wetland
- Tidal Flat
- Inundated Area
- Wellhead Protection Zone I
- Wellhead Protection Zone II

Flood Zone Designations

- 1% Annual Chance of Flooding
- Regulatory Floodway
- 0.2% Annual Chance of Flooding

Worst-case Hurricane Surge Inundation Zones

Hurricane Category

- Category 1
- Category 2
- Category 3
- Category 4

N W E S

0 0.5 1

Miles

Data sources:
MassGIS - Infrastructure, Hydrology, and Administrative Data
ESRI - World Topographic Map - Base Map

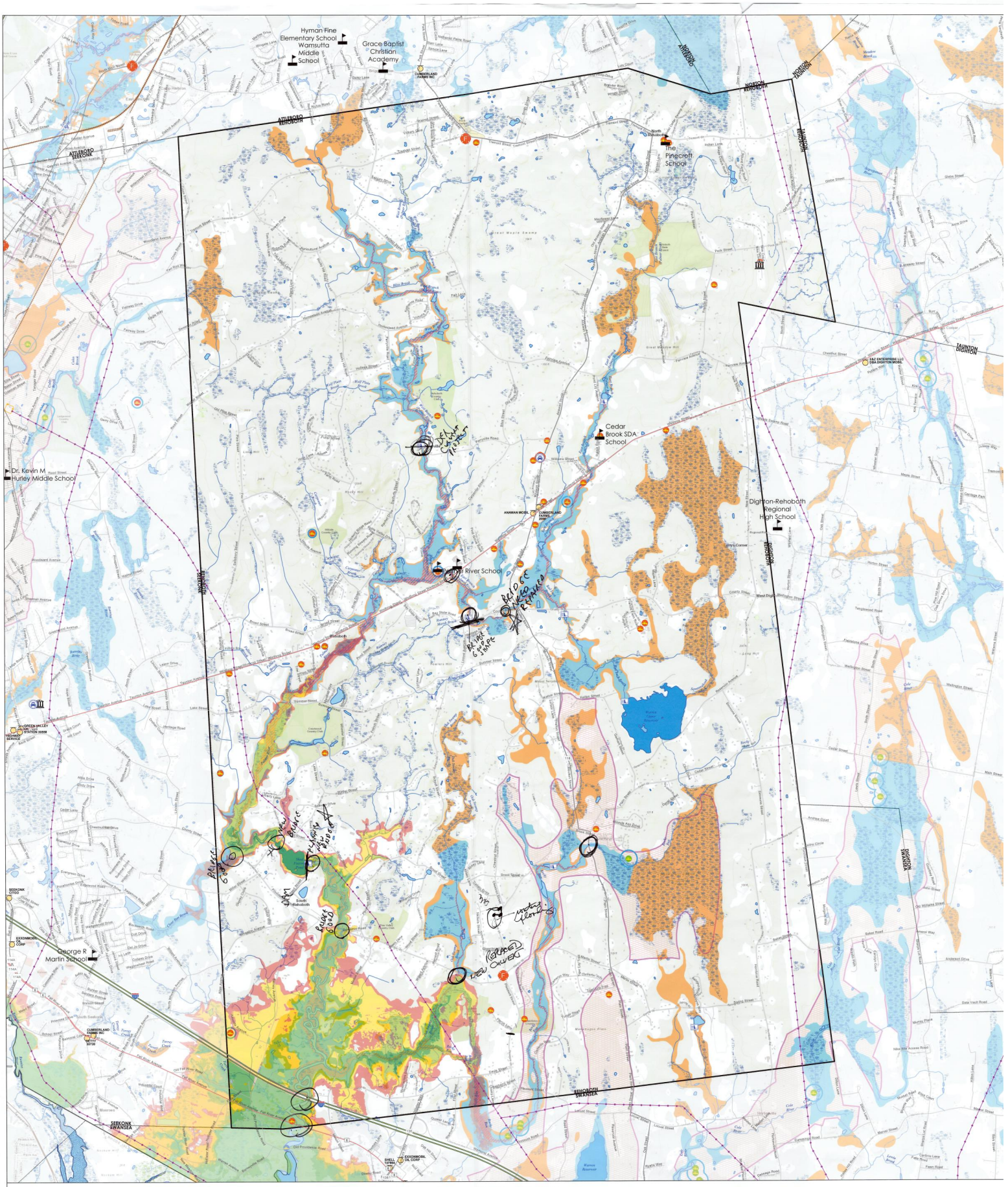
REHOBOTH, MA

MUNICIPAL VULNERABILITY PREPAREDNESS PROGRAM

FUSS & O'NEILL

Appendix B

CRB Workshop Outputs:
Participatory Mapping Exercise & Risk Matrices


Hyman Fine Elementary School
Warmsutta Middle School
Grace Baptist Christian Academy
The Pinecroft School
Cedar Brook SDA School
Dr. Kevin M Hurley Middle School
Dighton-Rehoboth Regional High School
George R Martin School
Town Hall
Police Station
Fire Station
School
Community Groundwater Source
Surface Water Intake
Non-Community Groundwater Source
Underground Storage Tanks
Dams
Railroads - Active Service
Powerline
Substation
Perennial Stream
Intermittent Stream
Shoreline
Intermittent Shoreline
Manmade Shoreline
Ditch/Canal
Pond, Lake, Ocean
Reservoir
Wetland
Salt Wetland
Tidal Flat
Inundated Area
Wellhead Protection Zone I
Wellhead Protection Zone II
Flood Zone Designations
1% Annual Chance of Flooding
Regulatory Floodway
0.2% Annual Chance of Flooding
Worst-case Hurricane Surge Inundation Zones
Hurricane Category
Category 1
Category 2
Category 3
Category 4
N
W
E
S
0
0.5
1
Miles
Data sources:
MassGIS - Infrastructure, Hydrology, and Administrative Data
ESRI - World Topographic Map - Base Map
REHOBOTH, MA
MUNICIPAL VULNERABILITY PREPAREDNESS PROGRAM
FUSS & O'NEILL

Community Resilience Building Risk Matrix

www.CommunityResilienceBuilding.com

H-M-L priority for action / **S**hort or **L**ong term (and **O**ngoing)
V = Vulnerability

Top Priority Hazards (tornado, floods, wildfire, hurricanes, earthquake, drought, sea level rise, heat wave, etc.)

Features	Location	Ownership	V or S					Priority	Time
								H - M - L	Short Long Ongoing
Infrastructural									
Societal									
REAL TIME INFO REGARDING ROAD CLOSURES (FLOODS/FIRES) AND EMERGENCIES (GIS BASED)				WORKING WITH MEMA – NEEDS A CHAMPION ↓ needs local wizkid					
CONSIDER CH 90 for message boards									
Environmental									
AGI OBS / WATER CONSERVATION RELEASE	TW	P	V/S	INFO & FUNDING NEEDED FOR NEW TECH & APPS					
KETTLEBOTTOM STATE FOREST	~~S~~ NO	S	V/S	COMMUNICATE WITH STATE GET INFO ON FOREST MGT PLAN, MAINT FIRE ACCESS RD, MORE					
INFORMED/ACTIVE AGI NETWORK		S							
MDAR & BOH INSPECT/EDUCATE MANURE MGT		S/V		MAINTAIN RELATIONSHIP WITH FARMER RUNX WATERSHED					
BRISTOL CTY CONTROL		S		SPRAYING & CLEANING SERVICES					
GROUNDWATER PESTICIDE RUNOFF (GOLF)		V/S V		RUNOFF directed outside recharge area need more info — POTENTIAL WATER RESOURCES					

Community Resilience Building Risk Matrix

www.CommunityResilienceBuilding.com

H-**M**-**L** priority for action over the **S**hort or **L**ong term (and **O**ngoing)
V = Vulnerability **S** = Strength

Top Priority Hazards (tornado, floods, wildfire, hurricanes, earthquake, drought, sea level rise, heat wave, etc.)

Features	Location	Ownership	V or S	FLOODING	WIND	DROUGHT	SEVERE STORMS	Priority H-M-L	Time Short Long Ongoing
Infrastructural									
PRIVATE WELL DRILLING REPORTS ~~~2500~~ 4100 TOTAL	TOWNWIDE	PRIVATE	V, S	√		√			
COMPILE & ANALYZE & DIGITIZE REPORTS (~2500) ALL TOWN WATERS									
(1) COMPREHENSIVE STUDY OF WATER RESOURCES ↑ INCLUDE CULVERTS — BUILD OFF DRAINAGE STMDY									
(2) MS4 STORMWATER SYSTEM	TOWNWIDE	PUBLIC	V, S	√			√		
DEVELOP COMPREHENSIVE IDDES									
COUNTY SR BRIDGE / CONDITION									
Societal BRIDGE ON 44 (SCHOOL) STATE HWY									
DRAINAGE ISSUES — NEW CULVERT CONSTRUCTION	TALK TO MASSDOT FOR FIX								
Environmental									

Community Resilience Building Risk Matrix

www.CommunityResilienceBuilding.com

H-M-L priority for action over the Short or Long term (and Ongoing)
V = Vulnerability S = Strength

Top Priority Hazards (tornado, floods, wildfire, hurricanes, earthquake, drought, sea level rise, heat wave, etc.)

Features	Location	Ownership	V or S	Drought	Flood	Severe Storms	Wind	Priority H-M-L	Time Short Long Ongoing
Infrastructural									
New Town Hall/Command Cent/Shelter				Resilient to power outages, water supply issues, floods, etc. centrally located, telecom/wireless connectivity. Microgrid/ solar & battery other public buildings					
Societal									
Public Ed / Outreach			√	D, F, S, W	Flood prone areas, town's initiatives/practices, evac., etc.				
Communications System			V/S	"	Create more sophisticated communications system to inform public prior to and during events; water supply, road closures, evac. routes, shelters, etc., battery chargers possibly linked?				
Transportation for Vulnerable Populations			√	F, S	Avoid using emerg. services as current practice.				
Neighbor-to-Neighbor Assistance				F, S	Potential program that can help identify vuln. pops. promote neighbors assisting each other. Can people sign up for help? Volunteers				
Access to Shopping/Groceries			V/S		Locally sourced Produce				
Environmental									
Private Well supplies			√	P	Is it necessary to limit water use to prevent effects on neighboring wells? How to regulate/monitor? Legal?				
Tree Vulnerability				S, W	Nike Park, Red Way Plain (leased to farmers)				
Regulatory Change				Regulations & By-laws pertaining to groundwater recharge, well protection, stormwater mgt.					

Appendix C

CRB Workshop Presentation Materials

FUSS & O'NEILL

Boston Firefighters, January 4, 2018 (Reuters)

Cambridge Reservoir, Lincoln, MA (Boston Globe)

Municipal Vulnerability Protection Program
Community Resilience Building Workshop
Town of Rehoboth

May 10, 2018

Community Resilience Building Workshop

Agenda

- CRB Team and participant introductions
- Introduction to Massachusetts Municipal Vulnerability Preparedness Program (MVP)
- Introduction to Climate Change and the Town of Rehoboth
- Discussion by Rehoboth representatives on status of current planning
- Introduction to CRB Workshop process

- Large group
  - Determine top four hazards

- Small work groups (Using Risk Matrix)
  - Identify Rehoboth's vulnerabilities and strengths
  - Prioritize response actions

- Lunch

- Large group
  - Report out from small groups
  - Determine overall priority actions for the Town

- Discussion on next steps
- Conclusion

FUSS & O'NEILL

Fuss & O'Neill Overview

At Fuss & O'Neill, we place great emphasis on collaboration; both within the company and with our clients. We are guided by what is best for the client and the project – in identifying client champions, naming project leaders, building project teams, and providing responsive service and quality deliverables.

We strive to partner with our clients to understand their businesses and to be stewards of their resources as if they were our own, and aim to develop services and solutions that anticipate evolution of their unique business needs.

FUSS & O'NEILL

MVP Project Team

Mary Monahan

Mary is a municipal public works specialist well-versed in issues related to stormwater management; wastewater collection and treatment; drinking water supply, treatment, and distribution; solid waste management; and sustainable operations. Mary serves as a liaison between the public works project owner and the design team.

Kurt Mailman

Kurt manages diverse wastewater and stormwater management projects from evaluation of pumping systems to capital improvement plans, funding, assessment, and design of challenging hydraulic conveyance systems and training of operations staff. He is adept at managing all aspects of complex multidisciplinary projects from project initiation through construction and commissioning of facilities.

Shawn Martin

Shawn's diverse project experience in land development includes surveying, land planning, environmental site assessments, stormwater management, water distribution, and wastewater collection and treatment systems. He is expert at the application of low-impact development strategies for a broad range of project types, including Brownfields sites with complex environmental conditions.

FUSS & O'NEILL

MVP Program - Rehoboth $15,000

- Grant Supports Climate Change Vulnerability Assessments and Resiliency planning
  - Comprehensive Approach
    - Infrastructure
    - Society
    - Environment
  - Scope and Process Use the Guidance in the Community Resilience Building Workshop Guide
  - Municipalities That Complete This Process Will Be Designated Municipal Vulnerability Preparedness (MVP) Municipalities

MVP Designation May Lead to Enhanced Standing in Future Funding Opportunities

FUSS & O'NEILL

MVP Action Grant NEW

- Grant supports priority actions identified at Community Resilience Building Workshop
- $10,000 - $400,000 available
- Local match of 25% - can be in-kind
- Priority given to projects that propose nature-based solutions, green infrastructure, and enhancement of natural systems
- Phased approach encouraged
- Application deadline May 18
- Project award early June
- Next funding round anticipated early in FY19

Only those communities which have completed the CRB workshop are eligible to apply

FUSS & O'NEILL

Terminology

Climate Change

The Change in Usual Climate Conditions

- Rising Temperature
- Changing Precipitation/ Rainfall Amount and Intensity
- Sea Level Rise

Town of Rehoboth – Narragansett Bay and Mt. Hope Bay Basin

Rising Temperature

Narragansett Bay and Mt. Hope Bay Basin	Observed Baseline 1971-2000	Projected Change in 2030s	Projected Change in 2050s	Projected Change in 2070s	Projected Change in 2090s
Average Annual Temperature (°F)	50.46	2.07 to 3.81	2.71 to 6.04	3.21 to 8.67	3.49 to 10.61
Annual Days with Maximum Temperature over 90°F (Days)	7.08	4.89 to 13.51	7.18 to 28.94	8.93 to 50.87	11.52 to 66.23
Annual Days with Minimum Temperature below 32°F (Days)	120.51	-14.39 to -28.92	-19.61 to -45.66	-24.28 to -58.55	-25.86 to -68.72

FUSS & O'NEILL

Climate Change Impacts - Temperature

- Economic
  - Winter Recreation
  - Snow and Ice
- Agricultural
  - Longer Growing Season
- Health
  - Increased Pests
  - Heat Stroke
- Infrastructure
  - Road Buckling
  - More Potholes
  - Power Outages
- Environment
  Change in Habitat
  Fish species and shell fish migration northward

FUSS & O'NEILL

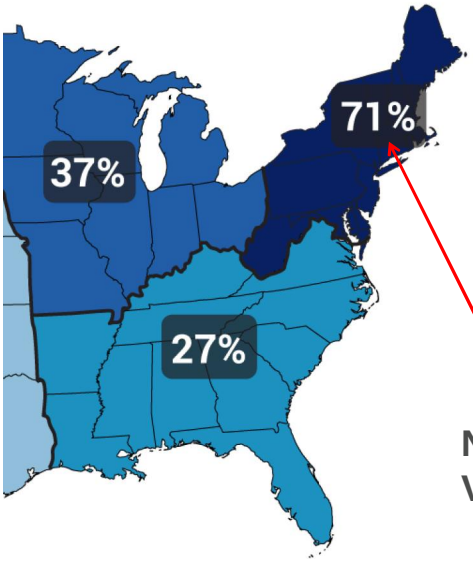
Town of Rehoboth – Narragansett Bay and Mt. Hope Bay Basin

Changing Precipitation

Narragansett Bay and Mt. Hope Bay Basin	Observed Baseline 1971-2000	Projected Change in 2030s	Projected Change in 2050s	Projected Change in 2070s	Projected Change in 2090s
Total Annual Precipitation (Inches)	46.69	-0.12 to 4.17	0.65 to 5.87	1.37 to 7.03	0.77 to 8.06
Annual Consecutive Dry Days (Days)	17.27	0.05 to 1.84	-0.02 to 2.38	-1.29 to 3.19	-.97 to 33.92

FUSS & O'NEILL

Changes in Rainfall Events



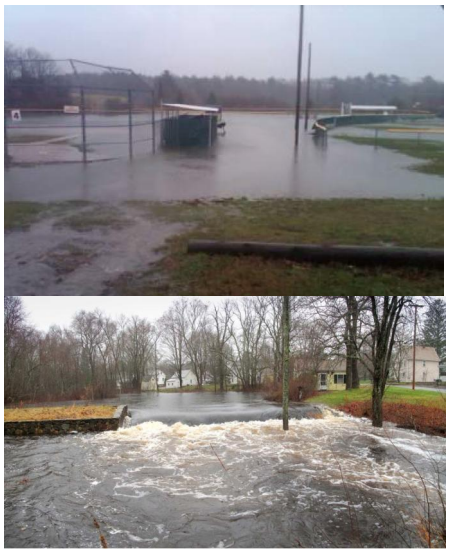
Percent increase in the amount of precipitation falling in very heavy events (defined as the heaviest 1% of all daily events) from 1958 to 2012.

Northeast has the highest Variation in the Country

FUSS & O'NEILL

Climate Change Impacts - Precipitation

- Economic
  - Dangerous Floods
- Agricultural
  - Excessively Wet Spring
  - Drought
- Health
  - Flood/High Water-related Deaths
  - Emergency Response Delays
- Infrastructure
  - Road Washout
  - Environment
  - Sewer System Overflows
  - Compromised Bridges
- Changes in Habitat



FUSS & O'NEILL

Hazard Mitigation and Emergency Management Planning in Your Community

Local Leaders

FUSS & O'NEILL

MVP Program

- Identify Top Four Hazards
  - Review MVP Sectors
  - Maps as tool
  - List infrastructure, societal, environmental feature
  - Determine whether a vulnerability or strength
  - Identify actions to reduce vulnerability or reinforce strength
  - Prioritize actions
  - Report Out

- Finalize Prioritization Plan

FUSS & O'NEILL

Risk Matrix

Community Resilience Building Risk Matrix www.CommunityResilienceBuilding.com

H-M-L priority for action over the Short or Long term (and Ongoing)
V = Vulnerability S = Strength

Top Priority Hazards (tornado, floods, wildfire, hurricanes, earthquake, drought, sea level rise, heat wave, etc.)

Features	Location	Ownership	V or S					Priority H - M - L	Time Short Long Ongoing
Infrastructural									
Societal									
Environmental									

FUSS & O'NEILL

Climate Change Hazards

- Flooding
- Extreme Precipitation Events
- Heat Waves
- Drought
- Snow/Ice
- Wildfire
- Tornadoes
- Hurricanes
- Nor'easters
- Other

FUSS & O'NEILL

MVP Sectors

- Infrastructure
  - Evacuation routes
  - Schools
  - Roads, bridges, dams
  - Water and wastewater
  - Septic systems
  - Hospitals
  - Commercial Buildings, churches
  - Utilities: electric, gas
  - Factories
  - Emergency management facilities

FUSS & O'NEILL

MVP Sectors

- Societal
  - Emergency shelters
  - Senior housing
  - Schools and campuses
  - Economically challenged populations
  - Evacuation plans
  - Animal shelters
  - Hospitals, pharmacies
  - Grocery stores
  - Utilities: electric, gas
  - Homeless
  - Other

FUSS & O'NEILL

MVP Sectors

- Environmental
  - Drinking water supply
  - Rivers and streams
  - Parklands
  - Agriculture
  - Title V systems
  - Stormwater management
  - Open spaces
  - Flood plains
  - Forest
  - Other

FUSS & O'NEILL

Community Resilience Building Workshop

Next Steps:

Public Review of Priorities
Monitor and Update
Annual Review

FUSS & O'NEILL

Community Resilience Building Workshop

Questions?