Town of Rockland
Community Resilience Building Workshop
Summary of Findings
May 2019

Hingham Street Reservoir David Ryan Boston Globe

Town of Rockland
Community Resilience Building Workshop
Municipal Vulnerability Preparedness Program
Summary of Findings

OVERVIEW

Recent years have seen notable weather extremes in Rockland. In March 2010 rainfall was so significant that a federal disaster was declared for eastern Massachusetts, resulting in $59 million in assistance to individual households and $26 million in reimbursements to the state and municipalities. The winter of 2015 brought record-breaking snow resulting in power outages. The following year, the Rockland area was under a drought warning from July to November 2016. Globally, the years 2012 through 2017 all rank among the ten hottest on record. The winter of 2018 once again brought severe winter storms with a succession of four nor'easters pummeling the town in March.

In 2017, the Commonwealth of Massachusetts inaugurated the Municipal Vulnerability Preparedness (MVP) program to assist municipalities in planning for and implementing strategies to adapt to predicted changes in our warming climate. The predicted changes include both increased flooding from large rain events and a greater likelihood of drought, increased extreme heat days and heat waves, and increased flooding from sea level rise.

The Town of Rockland, seeking to be proactive in addressing future climate threats, applied for a state grant to complete the Community Resilience Building (CRB) Workshop under the MVP program. Concurrent with the MVP program, Rockland is developing its first Hazard Mitigation Plan (HMP). The HMP is a five-year plan, developed under the auspices of FEMA that identifies strategies to address natural hazards. Upon completion of these projects, the Town of Rockland will be eligible to apply for state and federal grants to address identified natural hazards and climate risks.

The Town of Rockland partnered with the Metropolitan Area Planning Council (MAPC) to complete the MVP program and the Hazard Mitigation Plan. The MVP Core Planning Team identified and recruited community stakeholders to participate in the one-day CRB Workshop. Twenty-two people representing Rockland town staff, members of Rockland Boards and Commissions, and representatives of Rockland community organizations gathered on April 11 (see Workshop Participants page 8). The 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 the community;
- Identify immediate opportunities to collaboratively advance actions to increase resilience.

Materials provided for the workshop included local and regional data for changes in temperature, precipitation, and sea level recorded to date, as well as future projections to the end of the century. Posters provided data and mapping specific to Rockland infrastructure, demographics, and natural resources (see Appendix).

The participants considered Rockland's strengths and vulnerabilities focusing on infrastructure, society, and the environment. Working in small groups, and then together as a large group, they prioritized actions designed to increase Rockland's resilience to future extreme weather events.

Top Hazards and Vulnerable Areas

The Core Planning Team identified the top natural hazards. Based on the recent work on the Hazard Mitigation Plan and review of workshop materials, the team identified flooding, heat waves, severe storms (wind, snow, ice) and drought as the climate hazards of greatest concern facing Rockland. Flooding, drought, and severe storms have all affected Rockland in recent years. Considering town demographics, the team also included extreme heat as a top hazard.

Top Hazards

- Flooding
- Severe Storms (wind, snow, ice)
- Drought
- Heat Waves

Current Concerns and Challenges Presented By Hazards

Participants and town officials noted the increasing frequency and intensity of storms, including heavy rain events, the recent period of drought, and nor'easters that brought damaging winds and snowfall. The principal challenge presented by the nor'easters is the threat of power outages from falling trees and limbs. Large rain events result in flooding when local streams

exceed their banks, or due to overflow from Studleys Pond dam, as well as when stormwater drainage capacity is exceeded, and when groundwater levels are high. The status and management of Studleys Pond dam, and flood damage to downstream residents, is a particular concern during extreme rain events. Large rain events and the amount of rain experienced in the fall of 2018 tax the capacity of the wastewater treatment system. Drought threatens Rockland's capacity to supply drinking water as the town relies on wells and surface water sources. As these issues are not new the Town of Rockland, through its emergency management activities, has taken many steps to prepare for extreme weather and prevent harm to people and property. Workshop participants shared concerns that climate projections will heighten current challenges, particularly flooding, power outages, and water supply.

Areas of Concern

Geographic:

Most of the geographic areas were identified for their propensity to flood. Areas along French Stream above Studleys Pond dam include Plain Street and the Plain Street golf course, and Salem Street. Areas below Studleys Pond dam and along French Stream and associated wetlands were highlighted as a significant concern, including along John Dunn Drive and Norman Street. The area downstream of Studleys Pond dam has several properties that provide housing for low income residents, seniors, and disabled adults. Other areas, all of which are in close proximity to wetlands or waterways, include Rice Avenue and Leisurewoods Drive, French Road, Manzella Court, and Hingham Street.

Another concern identified was the potential for toxic releases, particularly in the event of flooding at current or former industrials sites. These include Southfield Center, Park Street, Airport Park Drive, and Industrial Way.

Societal:

Participants identified Rockland's growing diversity as a community strength. Concerns focused on the proximity of vulnerable populations to flood and winter hazards, and concern that language and cultural differences impede important emergency preparation and communications. Particular locations of concern include Leisurewoods, a 55+ community of mobile homes; Spring Gate, a large affordable housing rental community; and Studley Court, a Rockland Housing Authority property for seniors and the disabled. All have experienced flooding; Spring Gate apartments and Studley Court have single entrances that have flooded in the past. Concerns for those areas also include power outages, and access issues in the event of flooding or downed trees.

A key concern identified is the need to communicate with residents for whom English is not their first language. Participants also highlighted the need to consider cultural differences in developing strong relationships and communication.

Environmental:

Most environmental concerns related to water quality and water supply. Lack of water supply due to drought was highlighted, as was concern that chemicals or pollutants from industrial areas or previous contamination could impact water quality, particularly in the event of flooding.

Potential impact to water quality was also noted due to salt use on Beech Street where the road frequently freezes. The need to manage the trees for public safety, as well as for their health was a highlighted concern. Pests, including gypsy moths, was a concern for the future health of the tree population.

Infrastructure:
Studleys Pond dam was highlighted as infrastructure of key concern. Issues include overtopping of the dam as well as the condition of the dam. A critical issue is the downstream flooding that occurs and its impact residents including several low-income and elderly housing locations. Aging and undersized stormwater infrastructure was identified as a town-wide issue. Town facilities in need of upgrade or replacement include the fire station, and McKinley School, the brushfire truck, and several generators.

CURRENT STRENGTHS AND ASSETS

Workshop participants identified numerous Rockland strengths and assets that will support resilience to future climate impacts. Town strengths identified include social networks and organizations, facilities and emergency management, and natural resources.

- Many community organizations were cited as a strength in Rockland. These include: Rockland Chamber of Commerce, Men's Club, Knights of Columbus, Lions, Eagles, Rotary, Kiwanis, Girls and Boy Scouts including a strong Eagle Scout program, Meals on Wheels, and two effective food pantries.

- Social networks recognized included strong veteran's and youth sports programs, well-networked religious communities, the Brazilian community, good support services at Spring Gate apartments, and the artist community at the Sandpaper Factory.
- Rockland's diverse population was cited as a strength.
- Recognized town strengths included: active Council on Aging/Senior Center, Community Center programs for teens and youth, the school system comprehensive emergency plan, translation of Town Clerk documents, distribution of welcome packets to new residents and, highly effective snow removal.
- Emergency services recognized included: new police station with good backup communication, DPW natural gas generator, firefighting mutual aid, reverse 911, public health preparation for large emergencies, participation in the regional shelter program, local shelter facilities, development of a CERT team, and a regional 911 plan in place.
- Local assets include: easy access to Route 3, Brockton and South Shore hospitals nearby, availability of Park n Ride buses, 75% of natural gas pipes have been updated to plastic and, local hotels and a Home Depot that could be helpful in emergencies.
- A strong conservation movement was noted, including recent adoption of an updated Open Space plan, the addition of 108 acres of land for flood storage and conservation, and a strong environmental science program in the schools.
- Natural resource areas identified as strengths include: the Town Forest for recreation, biodiversity and flood storage; good land protection at the reservoir, the rail trail and, Hartsuff Pond for cooling and recreation.
- Focusing on trees, participants highlighted Rockland's tree warden and tree management and replacement program, the addition of trees near Norman Street, and National Grid's tree maintenance work in right-of-ways.
- Water resource strengths include: the stormwater bylaw and the MS4/stormwater management plan, annual brook and stream cleaning, and multiple drinking water sources. Management efforts include outfall sampling, water quality sampling for the Pleasant St. landfill, discharge management system, and addressing infiltration and inflow issues for wastewater management.
- Finally, participants recognized that Rockland is a Green Community and has a solar field at the recycling center.

Top Recommendations to Improve Resilience

Each of the three workshop groups identified vulnerabilities and suggested solutions. The solutions were prioritized as High, Medium, or Low. Each group then identified their five highest priorities. There was overlap in the top priorities of the three groups. The fifteen identified highest priorities resulted in twelve distinct items. Generally, the prioritized items fall into three topic areas: flooding and stormwater management, protection and outreach to vulnerable populations, and the need for infrastructure upgrades. The participants voted for their top five priorities (see Appendix). The issues identified as the highest priorities listed below reflect the top twelve issues listed in order of the number of votes they received.

Highest Priorities

Communication: Develop a comprehensive communication plan. Ensure that all have an evacuation plan. Encourage sign-up for emergency notices. Focus on reaching all populations

including seniors, and those whose do not speak English. Recognize potential barriers to communication including cultural and religious differences. Leverage the school system outreach capabilities. Work with tenant groups, and religious and community organizations to ensure effective and comprehensive communication. Convene a diverse committee to develop the communication plan.

Disaster planning: Target outreach to residents and vulnerable populations who live along streams and wetland areas known to flood.

Repair Studleys Pond Dam: The dam poses a threat to downstream flooding. The state should ensure implementation of needed upgrades.

Town-wide study of current and future flooding: Conduct an analysis of flooding risk and stormwater infrastructure. Update key stormwater drainage.

Upgrade the wastewater treatment plant: Extended and extreme rain periods cause the plant to exceed its permitted outflow limits. This has detrimental impacts on downstream water quality and strains the capacity of the pump systems.

Build a new fire station: The Fire Station needs to be relocated and replaced.

Address aging infrastructure: The town needs to establish an adequate maintenance budget for upkeep of buildings and streets.

Assistance to elderly and disabled: Do pre-planning for elderly and disabled residents who will need assistance in the event of an emergency.

Clear brooks of obstructions: Town brooks and streams need to be cleared of debris to prevent flooding. Continue and expand annual efforts. French Stream from North to Summer Streets is a high priority location.

Studleys Pond Dam flood protection protocol: Consider lowering the level of Studleys Pond when large rainstorms are forecast in order to increase water storage capacity and prevent downstream flooding.

Wetlands Bylaw: To ensure that the local wetlands bylaw can adequately address future climate change and new development, finalize or implement the extension of the buffer zone approved by Town Meeting.

Stormwater management: Future development at Union Point combined with existing impervious surfaces will exacerbate stormwater runoff. Stormwater management will be needed to address the potential for additional flooding.

High Priorities

- Complete the shelter designation process for the Senior Center and Middle School.
- Work with seniors, and those who may distrust emergency responders, to make connections to emergency response and use community programs to incentivize sheltering programs during emergencies.
- Maintain emergency planning and communications in the event of a chemical release at Airport Park Drive or Industrial Way.
- Ensure that Leisurewoods has emergency planning for power loss, confirm generator back up, clear trees, and ensure snow removal.
- Encourage a supermarket at Hingham Street to address the lack of a market in Rockland.
- As the entrance to the Spring Gate apartments floods, ensure generator capacity in the community room and facilities building.
- Renovate the Community Center; install new systems.
- Update Reverse 911/RAVE to ensure access for all needed languages.
- Improve communications on emergency preparedness and evacuation plans.
- To prevent flooding at Spring Gate apartments, consider planned pre-release from Studleys Pond dam prior to storms.
- The outlet pipe near Plain Street needs regular monitoring and maintenance to prevent flooding.
- Soil contamination and impervious surfaces at Southfield need ongoing cleanup by US Navy.

Medium Priorities

- Ensure that National Grid's tree trimming program is providing needed protection from windstorms.
- Adopt strategies to protect water supply: look for new sources, institute an outdoor water ban and fines for non-compliance.
- Acquire fire equipment to address brushfires in difficult to access locations.
- To address flooding at Hingham Street, explore natural flood storage north of North Avenue.
- An evacuation route is needed for flooding at Salem Street.
- Develop solutions for schools located in high heat areas: green buildings and roofs, solar power, tree and solar canopies, vertical gardens, and car pools.
- To address gas leaks, coordinate paving and gas upgrades with National Grid.
- Purchase backup generators for the three elementary schools.
- Replace the Studleys Pond dam/culvert. Design is 50% complete.
- Improve Brockton Areas Transit (BAT) by adding routes in Rockland – Union Street.
- Maintain containment systems and inspections for Tier 2 hazard areas in flood zones.
- Maintain and build relationships for the nine community regional shelter program.
- Check and confirm that long-term care facilities have adequate emergency plans.
- Connect with leaders in the Brazilian and Cape Verde populations to ensure adequate communications.
- Replace the Town Hall mobile generator with a fixed generator.

Low Priorities

- Maintain Rockland's Green Community designation.
- Research whether the hotels in town could serve as shelters in an emergency.
- Create an outreach program for public health. Look for grant funding.
- Investigate options to reduce salt use on Beech Street as it affects water quality.
- Manage drainage to reduce flooding at the Plain Street golf course.

No Priority Listed

- Develop a plan for wildfires.
- Ensure there is a budget to monitor water quality of runoff from the air base.
- Work with Rockland's churches for outreach to low-income and non-English speaking communities.
- Incorporate the food pantries into emergency planning.
- Utilize Eagle Scout projects for emergency communications.
- Work with Rockland's diverse populations to improve emergency communications.
- Increase aware of WIC and Self Help Inc. resources available to low-income populations.
- Increase communication, develop a buddy system, for isolated elders at Leisurewoods.

Listening Session

On May 16, 2019, the Town hosted a "Listening Session" to share climate information and the workshop results. As in the MVP Workshop, those attending the Listening Session considered solutions to vulnerabilities and identified their top five priorities. All of the highest priorities with the exception of "Clear Brooks of Obstructions". Votes were also recorded for the following high priorities: bring a supermarket to Rockland, update the Community Center, address soil contamination at Southfield, and explore natural flood storage to reduce flooding at Hingham Street.

CRB Workshop Invited Participants

* = representative attended
Rockland Selectmen*
Rockland Assistant Town Administrator*
Rockland Health Agent*
Rockland Sewer Superintendent*
Rockland Council on Aging
Rockland Building Commissioner*
Rockland Town Clerk*
Rockland School Superintendent*
Rockland Fire Chief*
Rockland Police Chief
Rockland Highway Superintendent*
Rockland Youth Commission*
Rockland Conservation Commission

Rockland Community Development
Rockland Assessors
Rockland Capital Planning
Rockland Finance Committee
Rockland Community Preservation Committee
Rockland Zoning Board of Appeals
Rockland Library Trustees
Rockland Housing Authority
Rockland Planning Board
Rockland School Committee
Rockland Housing Authority
National Grid*
Rockland Glenn Housing*
Abington Rockland Joint Water Works*
Rockland Open Space Committee*
Spring Gate Apartments*
South Shore Rehabilitation and Skilled Care Center*
South Shore Health System*
South Shore Hospital and VNA*
MEMA*
MA DPH Senior Preparedness Planner
Holy Family Church
Rockland Chamber of Commerce
REiMAGINE Rockland
Stop and Shop
Southfield Redevelopment Authority
Webster Park Rehabilitation Center

CRB Workshop Project Team

Rockland Core Team

Scott Duffey	Fire Chief, Project Lead
Marcy Birmingham	Interim Town Administrator
John Loughlin	Sewer Superintendent
John Lucas	Planning Board
Dan Callahan	Water Superintendent
Tom Ruble	Building Commissioner
Jeanne Blaney	Youth Commission
David Taylor	Highway Superintendent

Facilitation Team

Anne Herbst	Metropolitan Area Planning Council (Lead Facilitator)
Sam Cleaves	Metropolitan Area Planning Council
Darci Schofield	Metropolitan Area Planning Council
Martin Pillsbury	Metropolitan Area Planning Council

Citation

Metropolitan Area Planning Council. 2019. Town of Rockland Municipal Vulnerability Preparedness Program. Community Resilience Building Workshop Summary of Findings. Rockland, Massachusetts

Acknowledgements

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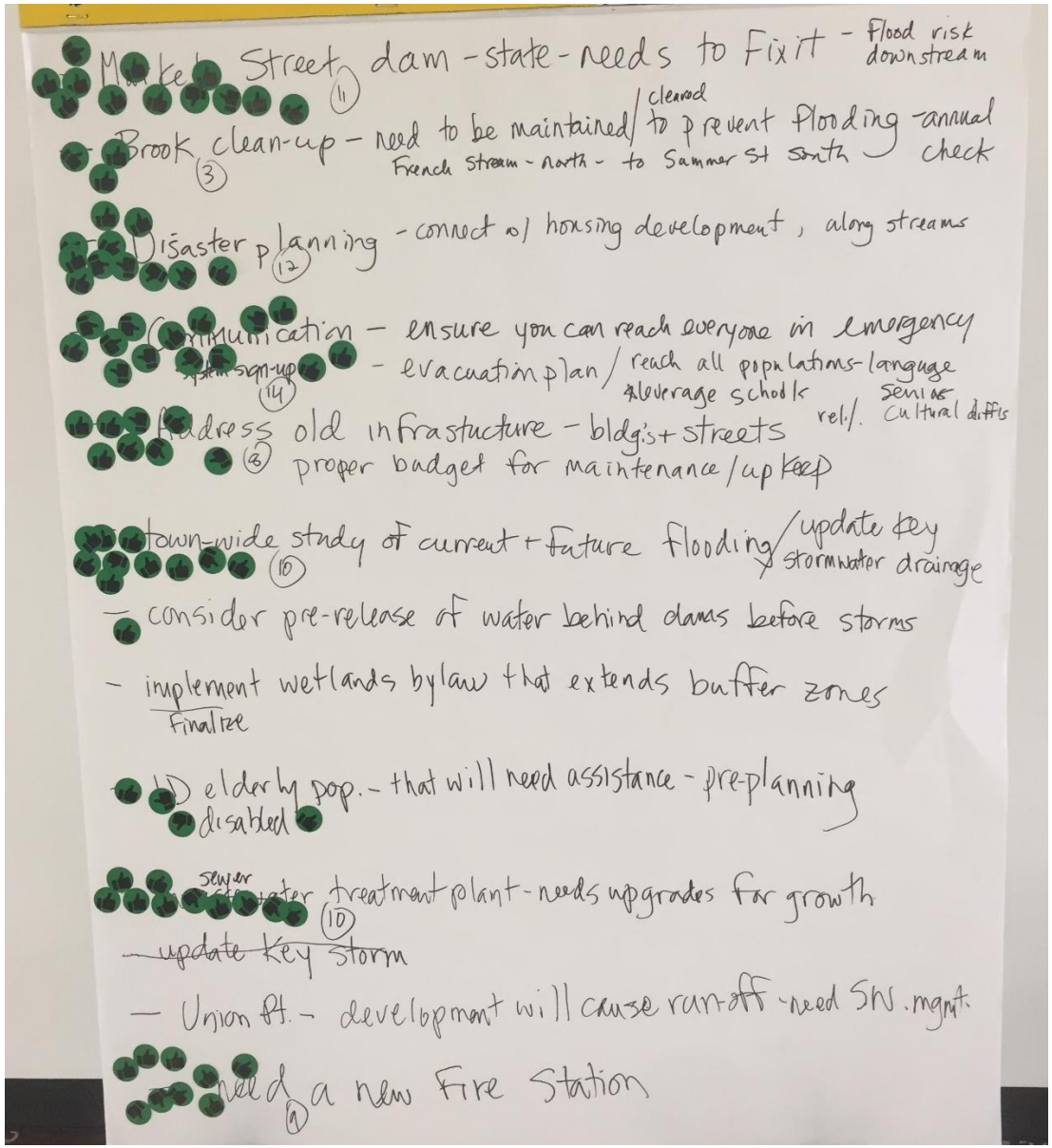
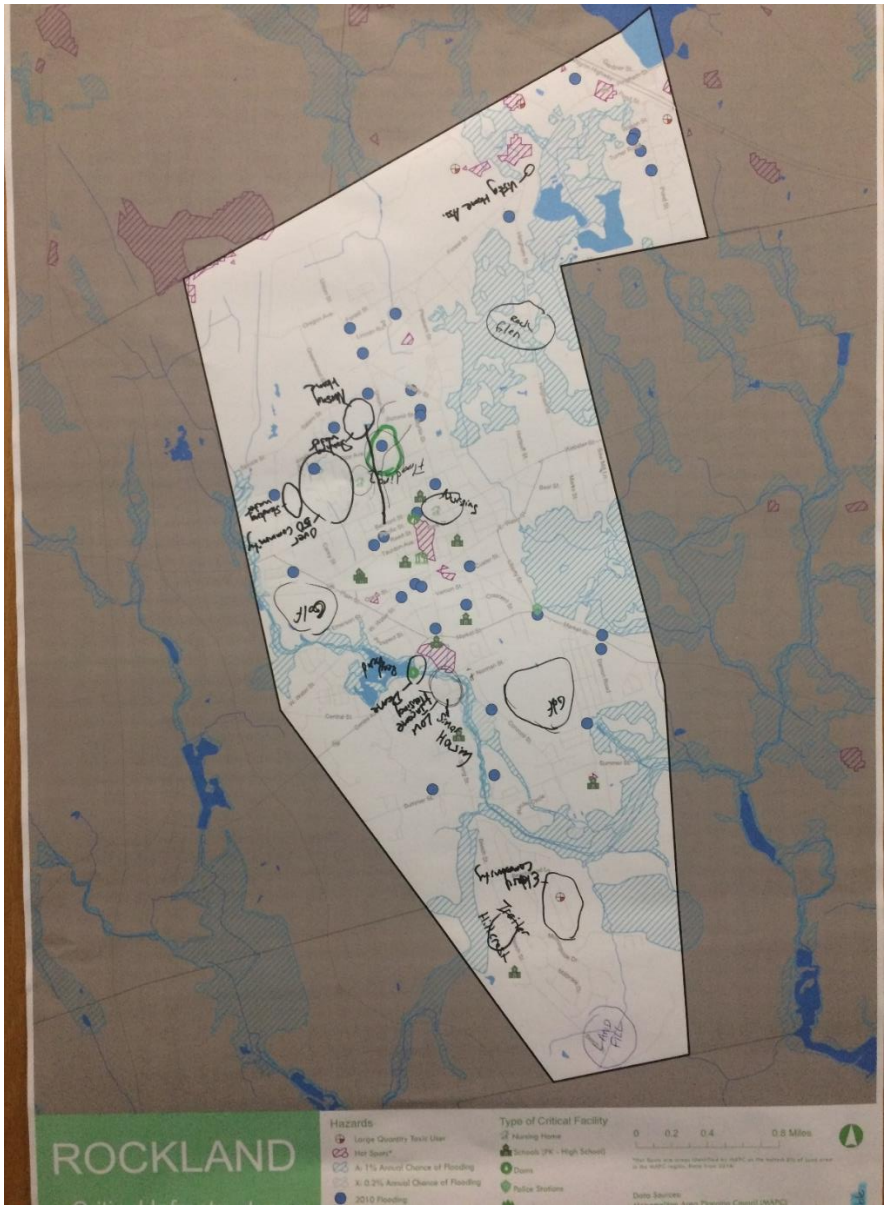
APPENDIX A–ACTION PRIORITIZATION, BASE MAP, AND WORKSHOP MATERIALS

Actions Prioritization



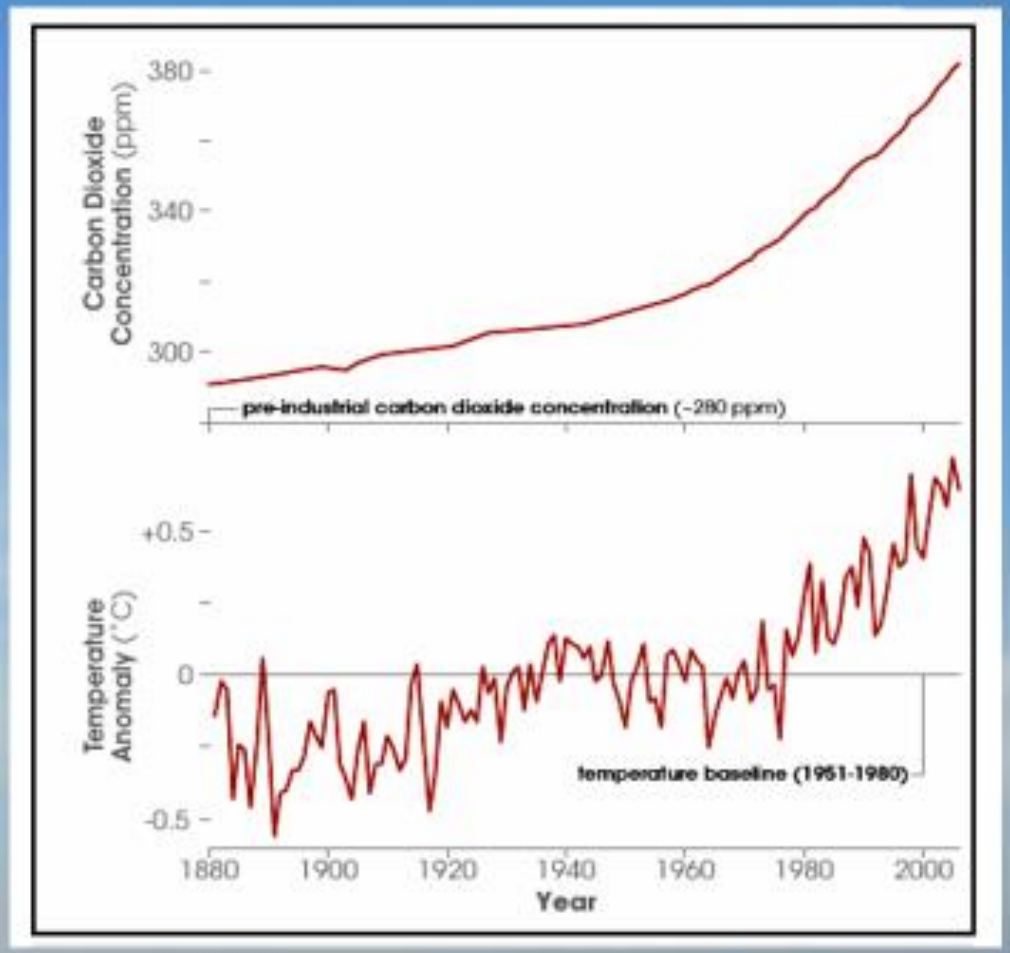
Base Map



PowerPoint


Our Warming Planet
Some energy is reflected back out to space
Earth's surface is heated by the sun and radiates the heat back out towards space
Greenhouse gases in the atmosphere trap some of the heat
Solar energy from the sun passes through the atmosphere

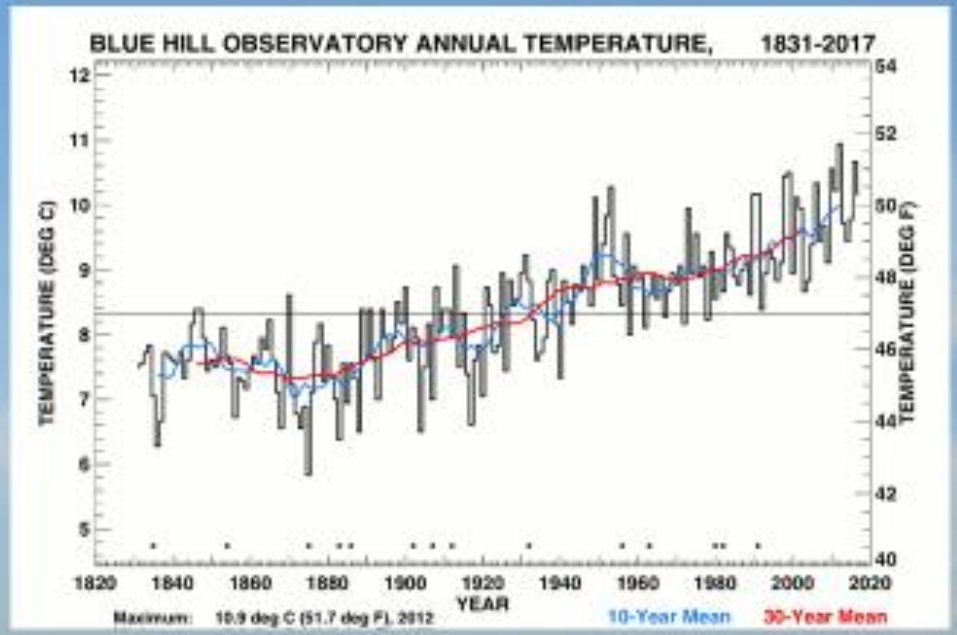
Global Temperature and CO_2 Trends



Source: MA Climate Change Adaptation Report 2011

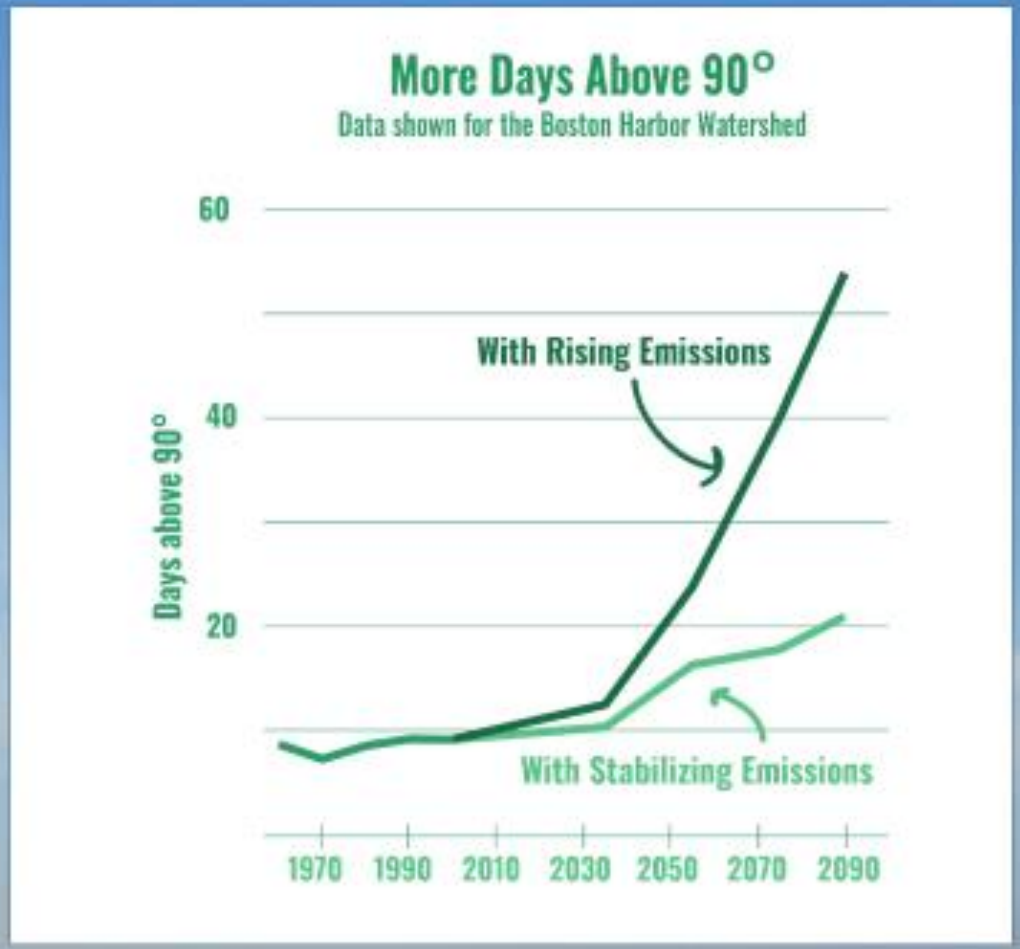
Temperature change: observed

Nearly 3° F since 1831



Blue Hill Observatory Annual Temperature, 1831-2017

Temperature change: projected

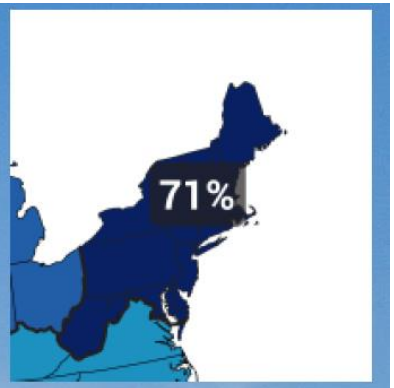


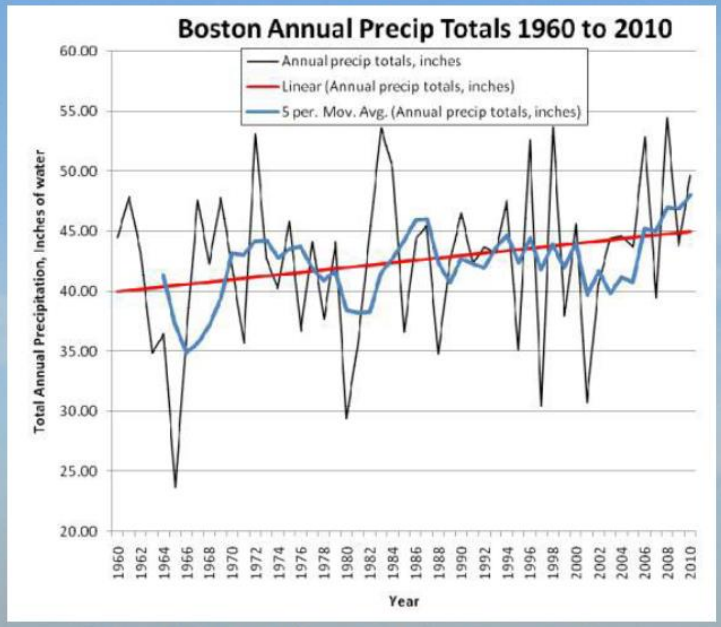
Source: Northeast Climate Adaptation Science Center

Precipitation change: observed

For the Northeast United States: 71% increase in the amount of rain that falls in the top 1% events from 1958 – 2012.

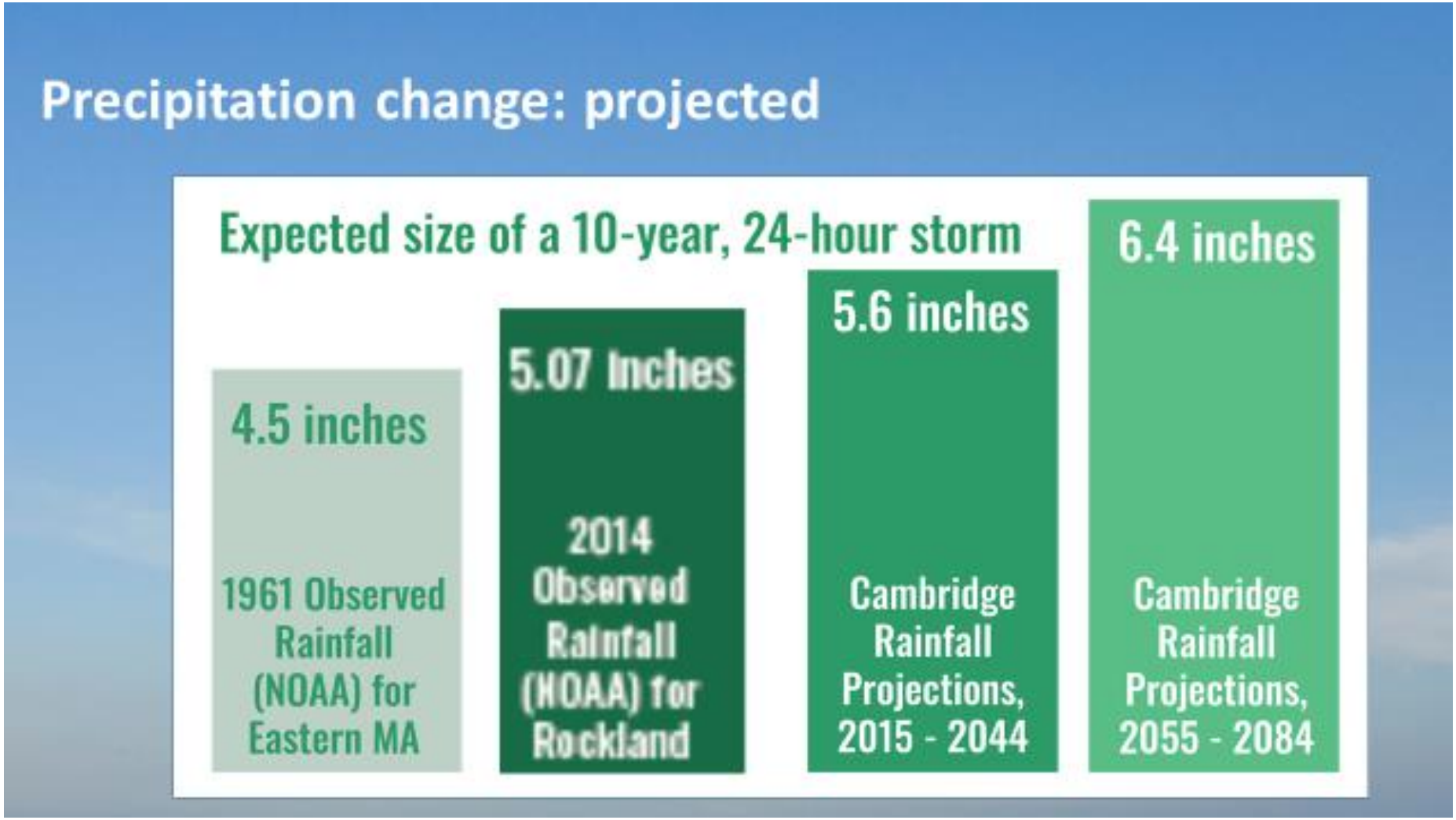
Source: US National Climate Assessment 2014





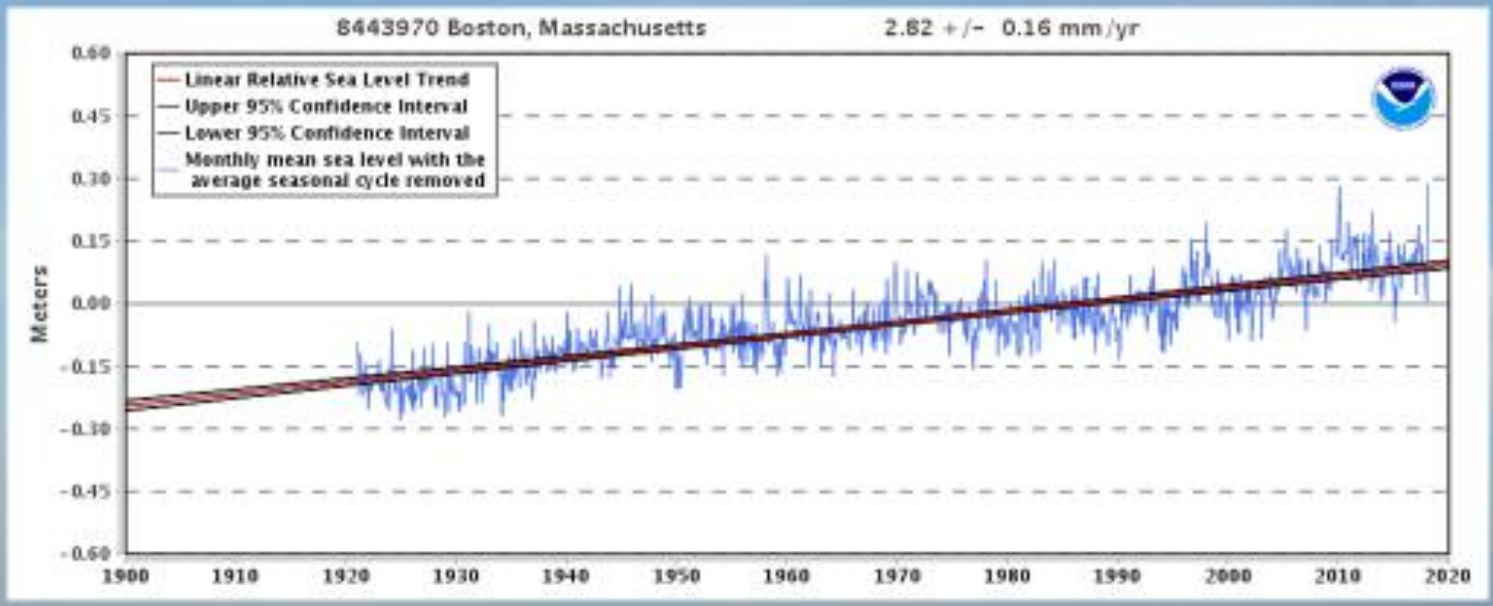
Source: MA Climate Change Adaptation Report 2011

For Boston area: 10% increase over the past 50 years

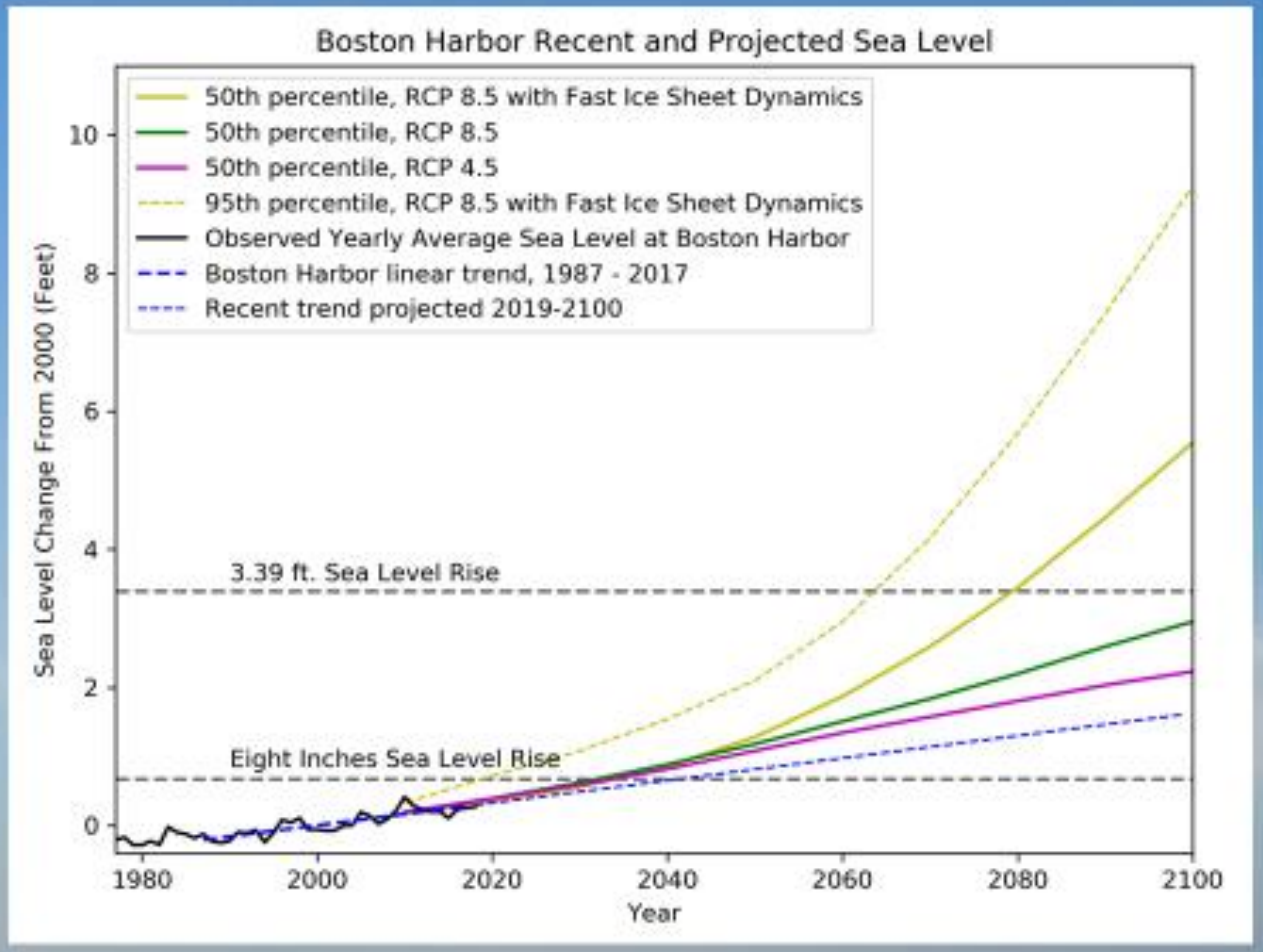

Precipitation change: projected
Expected size of a 10-year, 24-hour storm
4.5 inches
1961 Observed Rainfall (NOAA) for Eastern MA
5.07 Inches
2014 Observed Rainfall (NOAA) for Rockland
5.6 inches
Cambridge Rainfall Projections, 2015 - 2044
6.4 inches
Cambridge Rainfall Projections, 2055 - 2084

Sea level rise: observed

- Boston tide station
- Record from 1921-2017
- Equivalent to 11 inches in 100 years



Sea level rise: Projected to 2100 for Boston Harbor



Source: Northeast Climate Adaptation Science Center and MAPC

ROCKLAND

Critical Infrastructure

Infrastructure will be at risk to damage from flooding, and loss of function due to power outages. Increasing large rainfall events may subject roads, bridges, dams and buildings to more frequent or severe flooding. Areas that don't flood today may become vulnerable. FEMA flood zones reflect only current conditions, although the .2% (500-year) flood zones may indicate where future flooding will occur. FEMA flood zones also do not generally capture stormwater flooding. That is, flooding that exceeds the capacity of current stormdrains and culverts. We don't currently have models that project where future flooding from larger rain events will occur. Power outages affecting infrastructure and communications may become more frequent as result of high energy demand during heat waves. Winter outages could be caused by ice storms if warming results in temperatures hovering around freezing. The potential for more intense hurricanes could cause outages due to falling trees. Finally, buildings, roadways, and railways can be stressed by extreme heat. Heat can cause damage to expansion joints on bridges and highways, and may cause roadways to deteriorate more rapidly.

Other Features

- Rivers and Streams
- Water Bodies
- Critical Infrastructure

*Hot Spots are areas identified by MAPC as the hottest 5% of land areas in the MAPC region. Data from 2015.

Hazards

Locally Identified Hazard Areas

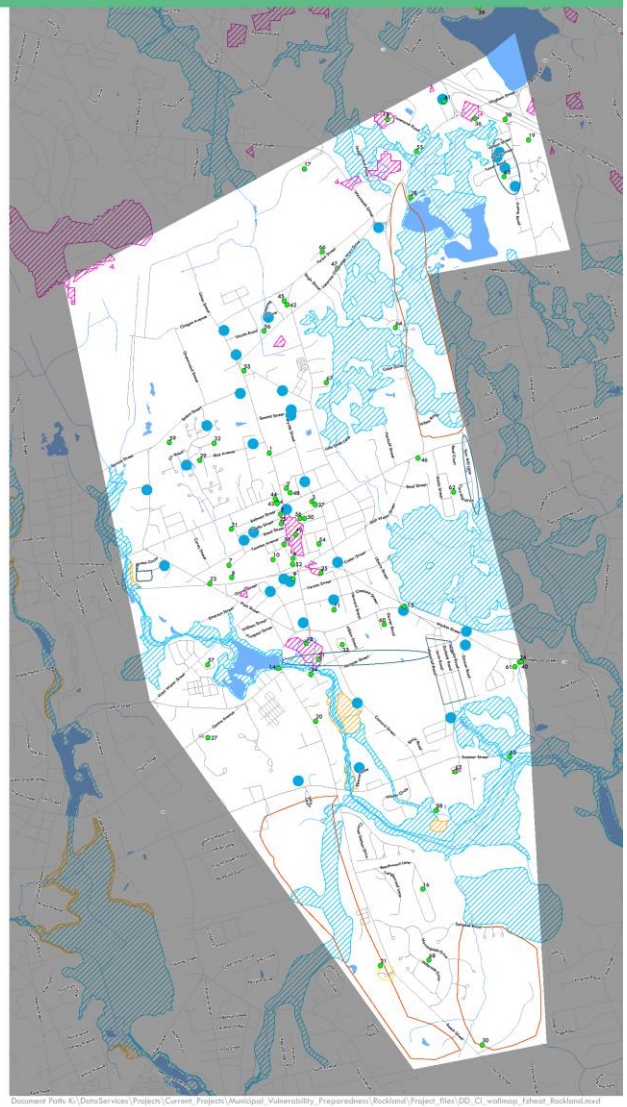
- Brush Fire
- Flooding
- Other
- 2010 Flooding
- Hot Spots*
- A: 1% Annual Chance of Flooding
- X: 0.2% Annual Chance of Flooding

Label	Facility
1	South shore Rehab and Skilled Nursing Center
2	Holy Family School
3	Coyne Health Care Center
4	Rockland Memorial Library
5	Rockland Fire Department
6	Rockland Town Hall / EOC
7	Memorial Park School
8	John W. Rogers Middle School/ Shelter
9	Tiffany II Rest and Retirement Home
10	Rockland Senior High School / Shelter
11	Jefferson Elementary School
12	Calvary Chapel Academy
13	Rockland Police Department
14	Studley's Pond Dam
15	R. Stewart Esten Elementary School/ Alternate Shelter
16	National Coating Corporation
17	ITW TACC
18	3M
19	Aircraftsinge
20	North River Collaborative
21	North River Collaborative - North
23	Council on Aging
24	Highway Department
25	Youth Commision
27	Water Department
28	Hannigan Water Treatment Plant
29	Rice Avenue Storage Tanks
30	Electric Substation
31	Electric Substation
32	Leisure Woods Elder Housing
33	Garden Terrace Elder Housing
34	Studley Court Elder Housing
35	ElectroSwitch Corp.
36	Home Depot
37	Verizon
38	Verizon
39	Communication Tower
40	Communication Tower
41	Communication Tower
42	Communication Tower
43	Rockland Day Care
44	Dove's Nest Day Care
45	Kinder Care of Rockland
46	Hanover Day Care
47	Kathy Corrigan's Child Care
48	Holy Family Church
49	First Congregational Church
50	Unitarian Universalist Church
51	Calvary Chapel
52	First Baptist Church of Rockland
53	Trinity Episcopal Church
54	First Church of Christ Scientist
55	Igreja Missionario Betel
55	Hingham North Wastewater Pump Station
56	United States Postal Service
56	Lincoln Wastewater Pump Station
57	John Burke Wastewater Pump Station
58	Plant Wastewater Pump Station
59	Spruce Wastewater Pump Station
60	Butternut Wastewater Pump Station
61	Market Wastewater Pump Station
62	Woodsbury Wastewater Pump Station
63	Old Country Way Wastewater Pump Station
64	Hingham South Wastewater Pump Station
65	Summer Wastewater Pump Station
66	Forest Wastewater Pump Station
67	Wheeler Wastewater Pump Station
68	Millbrook Wastewater Pump Station

Data Sources:
Metropolitan Area Planning Council (MAPC)
Massachusetts Geographic Information System (MassGIS)
Massachusetts Department of Transportation (MassDOT)
Federal Emergency Management Agency (FEMA)

March 2019

0 0.2 0.4 0.8 Miles



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Rockland

Social Vulnerability

Social vulnerability refers to social, economic, demographic, or health factors that may make groups of people less resilient to climate change impacts. Certain vulnerabilities tend to be correlated: for example, older adults are more likely to have a disability and live alone than younger adults.

Who is most at risk from climate change impacts?

People who may be more susceptible to negative health effects: These can include older adults, young children, pregnant women, people with disabilities, and people with pre-existing health conditions, as they are more likely to be physically vulnerable to the health impacts of extreme heat and poor air quality. Individuals with physical mobility constraints, such as people with disabilities and seniors, may need additional assistance with emergency response.

People who may have more difficulty adapting to, preparing for, or recovering from extreme weather events: Socioeconomic characteristics such as income and race can influence vulnerability to climate change. Low-income people are often more susceptible to financial shocks, which can occur after extreme weather and which can impact financial security and the ability to secure safe shelter, access sufficient food, and meet medical needs. Social isolation can also influence vulnerability, as it limits access to critical information, municipal resources, and social support systems. People at the most risk for social isolation include those living alone and people with limited English language proficiency.

People who live or work in vulnerable locations: Historic or predicted floodplain, urban flooding locations, areas prone to wildfire, heat islands, neighborhoods prone to power outages. Outdoor workers, first responders, those working in hot indoor environments.

Low Income Households

45% ± 5.6% Households in Rockland that are low-income

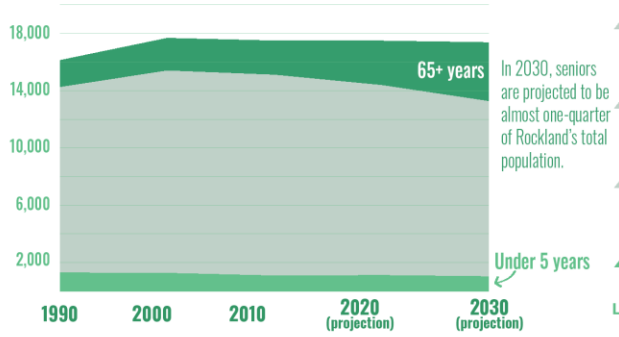
6% ± 2.4% Households in Rockland that are below poverty level

*A four-person household earning less than $78,150 is considered low-income; a four-person household earning less than $24,563 is below poverty level

Older Adults and Young Children

Adults over 65 and children under 5 are more likely to develop health problems on very hot days or during heat waves. Older adults are also more likely to have disabilities or mobility contraints and may need additional assistance during emergencies. They are also more likely to live alone than younger adults.

Rockland Recent and Projected Population by Age



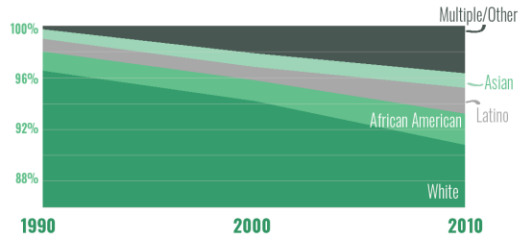
In 2030, seniors are projected to be almost one-quarter of Rockland's total population.

Communities of Color

Particular racial or ethnic groups may also be more likely to have certain social vulnerabilities than others. For example, Black and Latino populations have a much higher rate of asthma hospitalizations than other groups.

Rockland is becoming more diverse...

Although over 90% of the town's population is white, populations of color have increased since 1990.



People Who Work Outside

People who work outside on the land or on water, including first responders and other town employees, construction workers, or landscapers, may be at added risk from extra exposure to extreme weather and poor air quality.

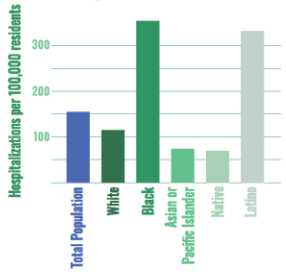
People Living Alone

As of 2010, over 25% of Rockland households consisted of someone living alone.

About 40% of people living alone were over 65.

People With Health Conditions

Massachusetts Asthma Hospitalizations



MAPC
METROPOLITAN AREA PLANNING COUNCIL

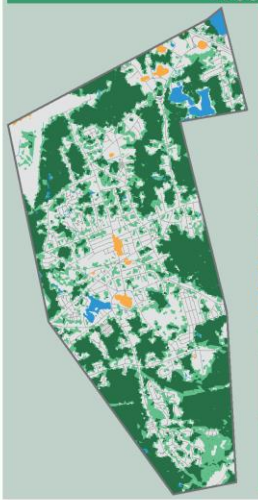
Sources:
American Community Survey (ACS) 2012-2016; United States Census 1990, 2000, 2010; MAPC Projections; Massachusetts Department of Public Health Asthma Data, 2008-2012

Rockland

Natural Resources

Natural Resources lessen climate impacts by absorbing and storing carbon dioxide and by serving vital protective functions. Forests, open space, wetlands, rivers, and streams protect drinking water quality and quantity, provide flood control, and give relief from extreme heat. Healthy ecosystems are more resistant to stresses from a changing climate and better able to protect against heat and flooding.

Trees

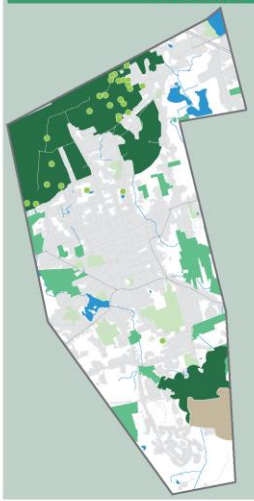


Trees are important in mitigating the impact of heat waves. According to the EPA, suburban areas with mature trees are 4-6 degrees cooler than new suburbs without trees. Shaded surfaces can be 25-40 degrees cooler than the peak temperatures of unshaded surfaces. Trees also absorb remarkable quantities of precipitation. Research has shown that a typical medium-sized tree can intercept as much as 2,380 gallons of rain per year (USDA Forest Service).

- 50% – 75% Tree Cover
- 75% – 100% Tree Cover
- Developed Land
- Hot Spots
- Water Bodies

Risk	Impact
Warming	Expected to shift forest type from Maple/Birch/Beech forest to Oak/Hickory forest similar to New Jersey.
Flooding, Drought, Wildfire, Ice Storms	Impaired waters, toxic exposure, contaminant leaching

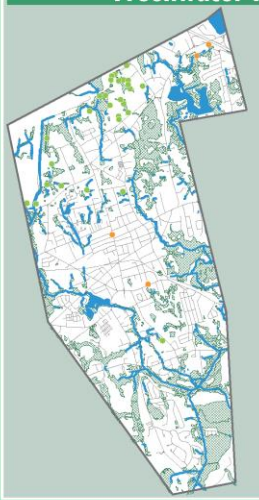
Valuable Habitat



Core Habitat and Critical Natural Landscapes are state-identified intact landscapes, or exemplary natural communities, that are better able to withstand climate stresses, and support the long-term survival of rare species and natural habitats.

- Core Habitat
- Critical Natural Landscape
- Permanently Protected Open Space
- Other Open Space
- Water Bodies
- Developed Land
- Vernal Pools

Freshwater Resources



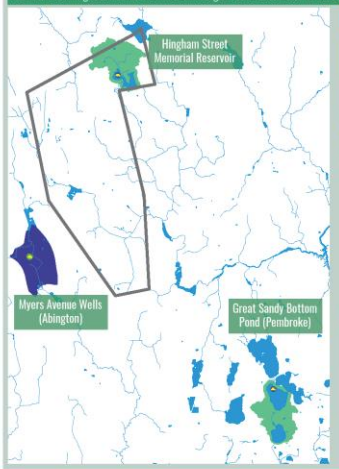
Rockland contains, healthy, intact freshwater wetland systems that sustain critical ecosystem functions in climate change. These ecological assets protect water quality and quantity, provide flood control, and maintain overall ecosystem health for climate resilience.

- Wetlands
- Water Bodies
- Developed Land
- Vernal Pools
- AUL Sites

Risk	Impact
Drought/ Warming	Seasonal no-flow/ low-flow, reduced absorption capacity, diminished fish habitat, algal blooms, low dissolved oxygen, reduced drinking water supply
Flooding	Impaired waters, toxic exposure, contaminant leaching
Extreme Precipitation	Scouring, impaired waters, sewer overflows

Drinking Water Resources

Rockland's drinking water comes from wells in Abington and surface water in Pembroke and Rockland.



- Water Bodies
- DEP-Approved Wellhead Protection Area
- Surface Water Protection Area
- Surface Water Intake
- Community Groundwater Source

Risk	Impact
Drought/ Warming	Seasonal no-flow/low-flow, stress to aquatic organisms, reduced drinking water supply
Flooding	Impaired waters, sewer overflows

Sources
MassGIS (Bureau of Geographic Information); BioMap2: Conserving the Biodiversity of Massachusetts in a Changing World: Massachusetts Department of Fish and Game; Massachusetts Department of Environmental Protection; MassGIS (Bureau of Georgraphic Information): National Land Cover Database (NLCD)

APPENDIX B – TABLE MATRIX RESULTS

Participants were divided into small groups identified as Blue, Green, Purple, or Red. Concerns were categorized as Environmental, Infrastructure, or Societal. Participants identified climate-related strengths and vulnerabilities for Rockland. Solutions were proposed for the vulnerabilities. Solutions were then prioritized as High, Medium, or Low. Each table was asked to identify their top three priorities. The information was recorded in a matrix for each table and is reproduced in the chart below.

Table	Category	Strengths & Vulnerabilities S and V	V/S	Solutions	Priority	Top Priority
Blue	Environment	Brook clean up	S/V	continuing cleaning up the brooks	H	
Red	Environment	Soil contamination at Southfield, lots of impervious surface	V	US navy responsible for clean-up, creates resources ($) for other actions	H	
Red	Environment	Park Street abandoned factory is a chemical hazard	V	Fire Dept. is working with DEP/EPA on clean-up. MA Development is providing funds	H	
Blue	Infrastructure	Concern for flooding associated with Reed's Studleys) Pond	V	connect w/ state to ensure they maintain their dam maintenance responsibility	H	Yes
Blue	Infrastructure	Aging stormwater infrastructure near Reed's (Studleys) Pond, and overall	V	some action has happened, maintain what exists, need to expand budget to adequately address it	H	Yes
Blue	Infrastructure	Flooding underground near and at Rice Avenue	V	Need more stream clearing and maintenance by Town and Sewer Dept. (vendor helps now)	H	
Blue	Infrastructure	Flooding at outlet pipe near Plain Street	V	Regular maintenance needed - needs monitoring	H	
Blue	Infrastructure	Airport Park Drive and Industrial way: concern for chemical release	V/S	maintain emergency plan and communication	H	
Green	Infrastructure	Dam at Reed's (Studleys) Pond overtops and floods whole area - Frenches Stream	V	Planned pre-release during storms. Work w/ highway dept.	H	Yes
Green	Infrastructure	Ledge/impervious surface NW part of town - water drains to the rest of town	V	do a town-wide study on flooding and SW infrastructure	H	Yes
Green	Infrastructure	Flooding at Spring Gate low income housing	V	Planned pre-release during storms.	H	

Green	Infrastructure	Do we have clarification on an evacuation plan?	V	improve communications on emergency preparedness/mgmt. and evacuation	H	
Red	Infrastructure	Fire station is old, and in a hot spot	V	replace and relocate - $25M cost	H	Yes
Red	Infrastructure	French Road stream flooding		update key stormwater drainage - French Rd. next project	H	Yes
Red	Infrastructure	WWTP is undersized	V	replace with expanded capacity	H	Yes
Red	Infrastructure	Reverse 911/RAVE need better access for non-English speakers	V	make this part of overall communication RAVE ha 47 languages	H	
Red	Infrastructure	community center is old/has systems problems	V	Renovate the building, install new systems - $15M	H	
Red	Infrastructure	town-wide undersized drainage	V	update infrastructure and drainage	H	
Red	Infrastructure	spring gate apt. entrance floods	V	add generator in the community room and facilities building	H	
Red	Infrastructure	no supermarket in town, food supply is 1.5 miles away	V	add market at Hingham St.	H	
Red	Infrastructure	Leisurewoods 55+ trailer park, power loss	V	confirm generator backup, clear trees, snow removal	H	
Blue	Society	need emergency communication, social media	V	work on outreach plan, need public information officer	H	Yes
Green	Society	communication challenges w/ vulnerable populations	V	Develop comprehensive communication plan: seniors, limited English, multi-cultural. Create a committee w/diverse expertise: fire, police, school, reps from vulnerable pops	H	Yes/w others
Green	Society	no access to emergency management plan	V	refer to school comprehensive plan - follow the template and practice	H	Yes/w others
Green	Society	communication challenges w/ limited English and seniors	V	work w/school on communication strategy - communications from the schools are better received by diverse populations	H	Yes/w others
Green	Society	need shelters at senior center, middle school	S/V	complete the shelter designation process	H	
Green	Society	seniors don't want to leave home in emergency/ religious diversity might cause distrust	V	ID seniors connect them to emergency response. Incentivize sheltering w/ community programs during emergencies	H	

Red	Society	emergency alert - not reaching non English speakers	V	Add Portuguese/creole/Spanish capacity to RAVE/Reverse 911. Market RAAVE	H	Yes
Green	Environment	wetlands bylaw insufficient for cc and new development	V	finalize wetlands bylaw TM vote w/state - extended buffer 25 -35 feet	H	Yes
Blue	Environment	Plain St. golf course damaged by flooding	V/S	maintain drainage	L	
Green	Environment	Rockland is a Green Community	S	maintain the designation	L	
Red	Environment	Beach St. freezes early - over salting affected water supply	V	salt management, investigate options	L	
Blue	Society	need for public health education	V	create an outreach program - town needs to take action, look for grant funding	L	
Blue	Society	hotels in town might be able to help in an emergency	S	research hotels and shelters in town	L	
Green	Environment	trees impact power supply - windy days and storms	V	confirm and validate tree trimming plan w/ National Grid	M	
Green	Environment	drought vulnerability in 2016 for drinking water - reservoir was drained	V	look to create new water source in town, outdoor watering bans, fines for non-compliance	M	
Red	Environment	French Stream, WWTO discharges to it	V	part of plant replacement, MS4 upgrades	M	
Red	Environment	gypsy moth, beetles	V	need biological controls, add green space w/ tree replacements	M	
Red	Environment	Beech St. is near hotspots, fire access is an issue	V	need4x4 pumper	M	
Red	Environment	Hingham St. reservoir provides good water supply	V/S	add gates, fencing, camera, security	M	
Green	Infrastructure	Hingham St. flooded in 2005 storm	V	explore natural flood storage north of North Avenue	M	
Green	Infrastructure	Salem St. flooding - over North Avenue	V	need evacuation route in that area during flood emergency	M	
Green	Infrastructure	School building are in heat vulnerability zone	V	green buildings and roofs, solar power, tree and solar canopy, vertical gardens, car pool	M	
Green	Infrastructure	Gas leaks and gas infrastructure	V	coordinate w/ National Grid on paving and gas upgrades	M	

Red	Infrastructure	3 elementary schools need backup generators	V	replace them 20K each	M	
Red	Infrastructure	the forest fire truck needs replacement, it is from 1937	V	need access at Beech Street for fire risk	M	
Red	Infrastructure	Studleys Pond Dam	V	50% design is complete, replace dam/culvert $20M	M	
Red	Infrastructure	Manzella Court - low area, infrastructure floods	V	update key stormwater drainage	M	
Red	Infrastructure	limited public transit - BAT limited service	V	add routes in Rockland - Union St.	M	
Red	Infrastructure	tier 2 hazard areas in flood zones	V	maintain containment systems and inspections	M	
Blue	Society	Norman St. and John Dunn Drive have elderly housing	V	research whether they have what they need for emergency	M	Yes/w others
Blue	Society	Rockland Place has low income housing	V	research whether they have what they need for emergency, backup power, education plan	M	Yes/w others
Blue	Society	Does housing for low income, elderly residents and in flood areas have backup power	V	research whether they have what they need for emergency	M	Yes/w others
Blue	Society	plan for long-term care facilities, can they shelter in place	V	town needs to check to confirm that facilities have an emergency plan	M	
Blue	Society	Brazilian and Cape Verde populations may need translation	V	Connect w/ leaders in the communities. Do research on communication methods	M	
Blue	Society	CERT team is being developed, led by Fire Chief	S		M	
Blue	Society	regional 9 community shelter program is in place	S	keep it going, keep building relationships	M	
Red	Infrastructure	town hall has only a mobile generator	V	replace it - this is EOC location, 20K	M/H	
Blue	Environment	risk of wildfire if weather dries up	V	need plan to address wildfire risk		
Blue	Environment	potentially contaminated runoff from the air base	V	ensure there is a budget for monitoring of water quality		
Blue	Environment	Trees have been added to the area near Norman Street	S			

Blue	Environment	A discharge management system is in place	S			
Blue	Environment	The town does sampling of outfalls	S			
Blue	Environment	The town has a tree and forest management plan. Trees and power outages are well-managed	S			
Blue	Environment	Water quality monitoring is happening at the old Pleasant St. landfill	S			
Green	Environment	Town forest provides trails, flood storage, biodiversity, nature programs	S			
Green	Environment	good land protection at the reservoir - no contamination	S			
Green	Environment	strong environmental science program in the schools	S			
Green	Environment	strong conservation movement in town - new open space plan	S			
Green	Environment	108 acres north of Frenches Crossing being acquired for flood storage and conservation	S			
Red	Environment	Rail trail	S			
Red	Environment	town has a tree warden and tree replacement program	S			
Red	Environment	National Grid has strong tree maintenance program in right-of-ways	S			
Red	Environment	Hartsuff Pond provides cooling and recreation	S			
Red	Environment	Rockland Town Forest				
Red	Environment	the town has an updated Open Space plan	S			
Red	Environment	solar field at the recycling area	S			
Red	Environment	the town has multiple water supply sources	S			
Blue	Infrastructure	MS4 Permit//Stormwater management plan	S	Town meeting funding will need to keep it a priority		

Blue	Infrastructure	The town is addressing Inflow and Infiltration to sewer system	S			
Blue	Infrastructure	The town has a stormwater bylaw	S			
Blue	Infrastructure	The town does stream and brook cleaning annually, helps w/ mosquito management	S			
Blue	Infrastructure					
Blue	Infrastructure	A regional 911 plan is in place and ready to use	S			
Green	Infrastructure	no substations for electricity in town	S/V			
Green	Infrastructure	Route 3 access for emergencies is effective	S			
Green	Infrastructure	snow removal is highly effective	S			
Green	Infrastructure	having a local Home Depot is helpful in emergencies	S			
Red	Infrastructure	two local hospitals - Brockton and South Shore	S			
Red	Infrastructure	Availability of Park n Ride Boston/Plymouth buses	S			
Red	Infrastructure	New police station with good backup communication	S			
Red	Infrastructure	DPW has natural gas generator	S			
Red	Infrastructure	Fire fighting has mutual aid	S			
Red	Infrastructure	natural gas systems has plastic pipe (new	S	75% of town has updated pipes		
Red	Infrastructure	The town is upgrading electrical substations and the grid	S	Also decreasing impervious area		
Red	Infrastructure	the high school is an emergency shelter	S			
Blue	Society	Not sure if elder are aware of emergency planning	S/V	maintain relationships and plans		
Blue	Society	Schools and Ref. Center are identified and have backup power	S	maintain relationships and plans		

Blue	Society	Public health has signs prepared for big emergency and evacuation	S			
Blue	Society	The town has reverse 9ll	S			
Blue	Society	Meals in Wheel is in place and utilized	S			
Green	Society	cultural diversity, lack of trust limits access to services	V	see comprehensive communication plan above		Yes/w others
Green	Society	welcome packets are sent to new residents	S			
Green	Society	in process of setting up shelters at senior center and middle schools	S			
Green	Society	Middle and High Schools have generators for emergency				
Green	Society	the schools have a comprehensive emergency plan posted in visible locations	S			
Green	Society	town clerk documents are translated in multiple languages	S			
Red	Society	strong artist community at the Sandpaper Factory	S			
Red	Society	Town Community Center programs for teens and youth	S			
Red	Society	Rockland Chamber of Commerce	S			
Red	Society	Men's Club	S			
Red	Society	Knights of Columbus, Lions, Eagles, Rotary, Kiwanis	S			
Red	Society	strong Brazilian community (2nd generation)	S			
Red	Society	low income folks have less access to resources	V	increase awareness of WIC and Self Help Inc.		
Red	Society	elder population at Leisurewoods living alone	V	increase cooperation and communication with town, create buddy system for emergencies		

Red	Society	Rockland has strong churches that are well networked	S	work with churches to create and implement outreach plan for communication w/ non-English speaking and low-income residents		
Red	Society	Two good food pantries	S	incorporate into communication plan, reverse 911, social media, flyers, door-to-door		
Red	Society	Girls and Boy Scouts - strong eagle scout projects	S	utilize Eagle Scout projects for communication		
Red	Society	Active Council on Aging/Senior Center	S			
Red	Society	Diverse population	S	ask leaders to communicate emergency planning and sign-up, create social work group		
Red	Society	strong veterans services	S	ask leaders to communicate emergency planning and sign-up, create social work group		
Red	Society	good support service program at Spring Gate apartments	S			
Red	Society	strong youth sports programs	S	they can be communications help		