Rockport Community Resilience Workshop May 29, 2018 Summary of Findings

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Acknowledgements

The project was conducted by the Metropolitan Area Planning Council (MAPC) with funding from Executive Office of Energy and Environmental Affairs. Special thanks to Chief McMorrow for initiating the program for the Town, to the Rockport Police and Fire for providing and arranging the workshop space, to Kevin Sweet, Town Administrator, for managing the process, and to all the participants who enthusiastically and diligently worked to create a more resilient Rockport

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CORE TEAM MEMBERS

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Joe Parisi	Director of Public Works
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Mark Schmink	Police/Emergency Management
Bruce Reed	Public Works
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Citation

Metropolitan Area Planning Council. 2018. *Town of Rockport Municipal Vulnerability Preparedness Program. Community Resilience Building Workshop Summary of Findings*. Rockport, Massachusetts.

Overview

In the last five years, Massachusetts has experienced increasingly more frequent and severe weather events. Record-breaking snowfall in 2015, an extensive and severe drought in 2016, the warmest year on record in 2017, and four Nor'easters in one month and flooding comparable to the Blizzard of 1978 in 2018 are just some examples. Climate Change is not imminent but affecting the people and cities and towns of the Commonwealth today. Rockport is currently challenged with localized flooding in roads, low drinking water supply during times of drought, water quality and stormwater management, and widespread loss of electricity during severe storms. However, Rockport has been proactive in planning and incrementally improving its resilience to natural hazards in the last eight years. The Town updated its Natural Hazard Mitigation Plan in 2012 and is preparing to update it. These combined efforts will minimize loss, maximize recovery, and protect its community in the face of our changing climate. Rockport envisions natural hazards and climate change as opportunities to build an even more vibrant, safe, and healthy community through these planning and action efforts.

Community Resilience Building Workshop

Rockport received a grant from the Massachusetts Executive Office of Energy and Environmental Affairs to participate in the Commonwealth's Municipal Vulnerability Preparedness (MVP) program. The program provides supports for municipalities to plan and implement key climate resilience actions using a community-based, multi-disciplinary, participatory planning effort through the Community Resilience Building (CRB) platform.[1] Rockport hired the Metropolitan Area Planning Council (MAPC) to administer the program with the community.

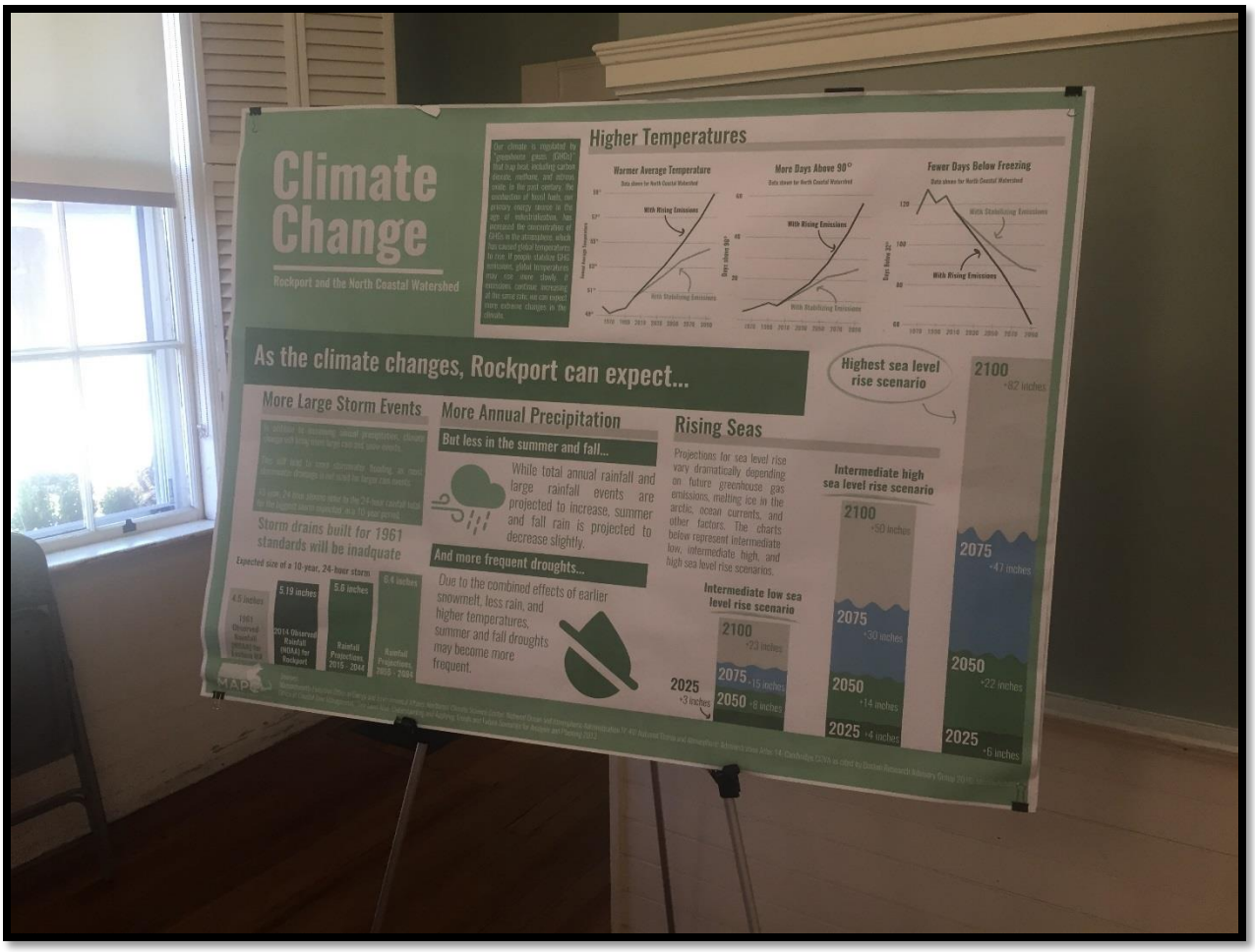
Participants were identified using guidance from the CRB Workshop Participant Worksheet[2] and MAPC's best practices in ensuring equity in climate adaptation planning.[3] Rockport's Town Administrator sent personal invitations to potential participants with broad sector/community stakeholder representation. Rockport gathered 19 participants across municipal departments, the school, housing, community groups, and political leaders to participate in the CRB workshop. Participants were assigned to small teams in a manner that maximized the diversity of sectors in any one given table. The goal in this method was to enhance different perspectives and identify resiliency opportunities that solved multiple vulnerabilities across sectors.

The Core Team outlined the following objectives for its MVP and CRB participatory planning event:

1. Understand connections between ongoing natural hazards and climate change on local planning and actions in Rockport.
2. Identify and map vulnerabilities and strengths of people and places, both buildings and natural environment/parks.
3. Develop and prioritize actions that reduce vulnerabilities and reinforce Rockport strengths.
4. Identify opportunities to advance actions that further reduce the impact of hazards and increase resilience in Rockport.

Figure 1 Informational poster on climate for Rockport MVP workshop.

1 www.CommunityResilienceBuidling.com
2 https://docs.wixstatic.com/ugd/29a871_7f4a484414be4e5f87d1041de9c8524f.pdf
3 https://www.mass.gov/files/mapc-equity-and-climate-planning-mvp-webinar.pdf



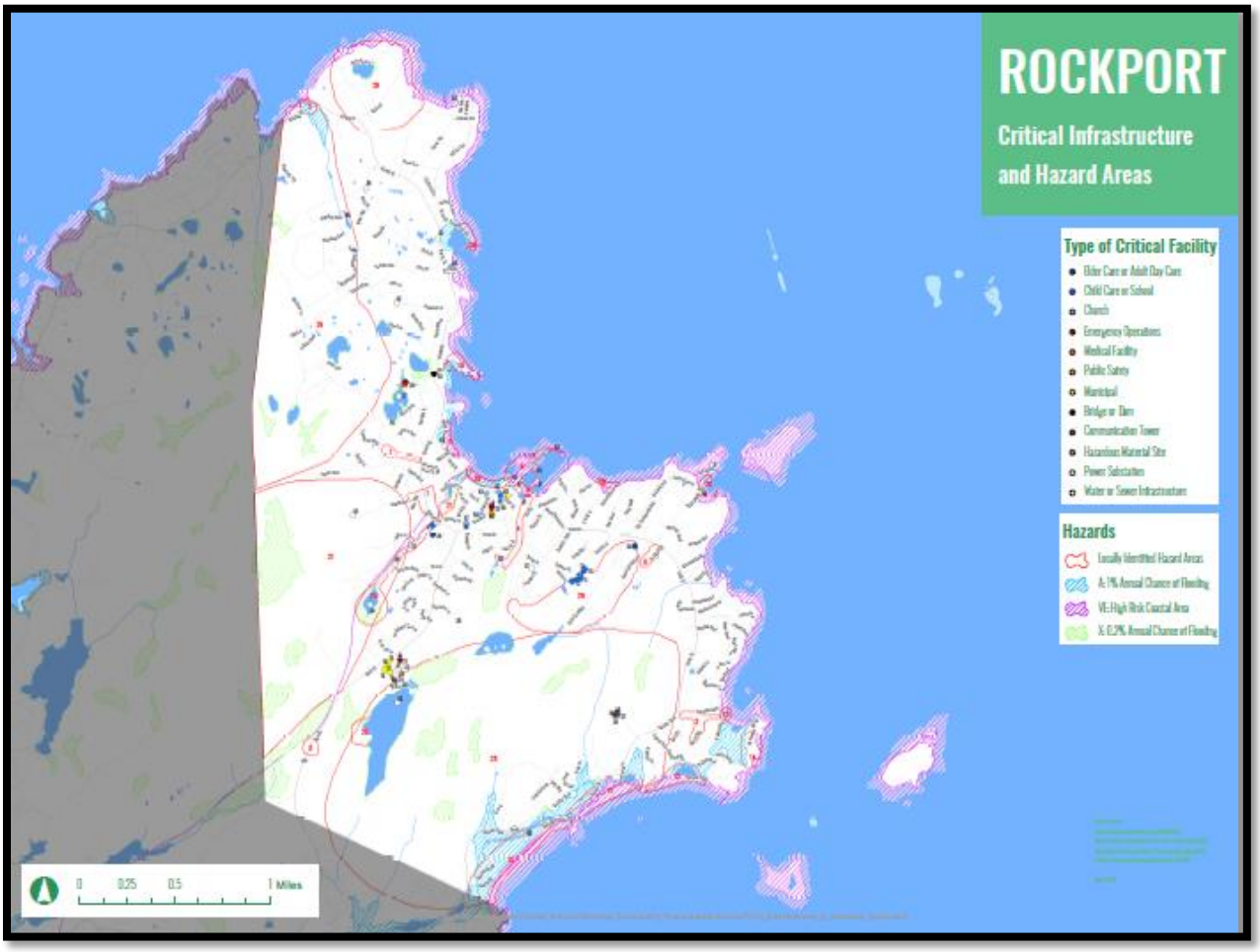
MAPC led and facilitated the workshop with four CRB-trained individuals. They provided to participants an introduction to climate change, climate observations and projections, and implications of these changes on the Town of Rockport's society, infrastructure, and environment. These were presented in both poster form (Figure 1) and power point presentation form. The following sources were used to inform the climate change introduction: (i) the Northeast Climate Science Center, (ii) National Oceanic and Atmospheric Administration, (iii) Cambridge Climate Change Vulnerability Assessment, (iv)the Boston Research Advisory Group, (v) Massachusetts Office of Coastal Zone Management, and Blue Hill Observatory and Science Center (Figure 1 and Appendix A). Furthermore, each small team had a table map (Figure 2) that identified Rockport's Critical Infrastructure, 1% Annual Chance Flood, locally identified hazards and areas of extreme heat.[4]

Participants brought wealth of knowledge and expertise from their respective yet diverse local experiences and fields and engaged in a consensus-building effort that gathered to "solve the problem" of climate change as noted by one participant. Driven by those who live and work in Rockport, the opportunity to advance resiliency is greatly enhanced through the CRB workshop

[4] MAPC uses land surface temperature data during the hottest periods of the summer months in 2016 to ascertain how likely an area may experience the urban heat island effect. We represented the area in Rockport that outlines the top fifth percentile of land surface temperature of the 101 communities in Metro Boston.

platform, a collaborative and consensus-building exercise for Rockport's future. After identifying the Town's vulnerabilities and identifying and prioritizing actions in their small groups using the CRB Risk Matrix (Appendix A), the participants reconvened to vote on their overall top priority actions as a large group.

Figure 2 Rockport Small Group working map



This report serves to provide a summary of findings from Rockport's one-day CRB workshop on May 29, 2018. The prioritized actions in this plan represent a collective and collaborate effort with on priority actions for climate resiliency and natural hazard mitigation.

Summary of Findings

Top Hazards and Vulnerable Areas

The Core Team identified top hazards for the community of Rockport. These hazards were determined by challenges the Town has already experienced from recent events, long-standing issues, and alignment with the Town's Natural Hazard Mitigation Plan update.

Town of Rockport Climate Hazards include:

- Coastal Flooding/Storm Surge/Sea Level Rise
- High Winds
- Extreme Cold/Winter Storms/Snow
- Extreme Heat/Fire/Drought

These hazards pose greater risks in some areas of the Town than others. Table 1 summarizes participants identified areas of significant concern. See Appendix C for complete matrices.

Table 1. Rockport areas of concern vulnerable to identified hazards.

Neighborhood	Societal	Infrastructure	Environment
Downtown: Bearskin Neck/Dock Square	Elderly/carless/non-English speaking/flood-prone area populations	Sewer pump stations	Stormwater runoff
Beach Street: Front and Back Beaches	Food access- all markets in Gloucester	Seawalls and breakwaters	Salt marshes/barrier beaches
Wharf Road/Marmion Way	People with mental Illness	T-Wharf/Lumber Wharf/White Wharf	Drinking water supplies
Thacher Road	Low income individuals	Cape Pond/Loop Pond earthen dams	Invasive species impacts
Brooks Road	Fishing community	Carlson Quarry dam	Erosion of living shores
Folly Cove	Evacuation from key neighborhoods- Long Beach	Rockport, Old Harbor and	Forest and open space: fires

		Pigeon Cove Harbors	
Penzance Road/Pebble Beach	Working with Gloucester on emergency management planning on Cape wide basis	Low lying electric and gas lines; propane tanks in exposed areas	
Long Beach		Waste water treatment plant	
		Beach drainage culverts	
		Roads susceptible to flooding: Thacher, Penzance, Long Beach	
		Senior housing facilities	

Current Concerns and Challenges Presented by Hazards

Participants and town officials noted the increasing frequency and intensity of storms, including nor'easters that brought damaging winds and snowfall, heavy rain events, and the recent period of drought. The principal challenges of the nor'easters are the threat of power outages, coastal flooding and lack of emergency access when low-lying roads flood. With increasing storm intensity, and rising ocean temperatures, the Town is also concerned that hurricanes such as Hurricane Sandy may extend further north with greater frequency. The recent drought of 2016 reawakened concerns over Rockport's water supply security as it relies primarily on smaller surface water supplies and municipal wells for its drinking water. Climate change is also seen as a significant challenge for the fishing industry in Rockport, one of the state's largest landing ports for lobster as the Gulf of Maine warms at an unprecedented rate. The Town is also concerned that heavy precipitation events may impact local dams such as the earthen dam at Cape Pond, a key water supply component. Workshop participants shared concerns that climate projections will heighten current challenges, and elevate new concerns, particularly public health issues related to high heat, as well as extreme cold and how they may impact weaker or isolated resident during extreme weather events. Although there are plans to add a new food market in Rockport soon, there were concerns that extreme weather events could prevent access to food markets as current markets are all in Gloucester, the closest being Stop and Stop, which floods during large coastal storms .Rockport has taken steps to prepare for climate change , with the most recent being the Town's Natural Hazard Mitigation Plan, completed in 2012 which the Town is preparing to update.

Areas of Concern

Geographic: Workshop attendees highlighted downtown areas subject to flooding from storm surge including Dock Square, Bearskin Neck and the lower end of Broadway/ Mt. Pleasant Streets. Other coastal flood prone areas included Beach Street, Marmion Way, Penzance Road, the Long Beach community, parts of Thacher Road, Wharf Road, Granite Street near Pigeon Cove Harbor and Folly Cove along with the Brooks Road neighborhood, a filled fresh water marsh area.

Societal:
Populations identified include: seniors and seniors who live alone, non-English speaking communities, low-income residents, renters, and people with health problems or disabilities. Also noted were populations living in nursing homes, residential facilities, senior housing and public housing. Participants were particularly concerned with barriers to emergency communication, and recognized that some residents have fewer resources to prepare for, endure, and recover from, severe weather events.

Environmental: Impacts to barrier beaches, coastal salt marshes and shoreline erosion were noted as major environmental concerns. The impact of drought, precipitation intensity and timing of rain events and drought were noted as concerns for maintaining conditions for a healthy water supply and forested/open space areas. Stormwater runoff was seen adding to both non-point pollution problems as well as contributing to flooding during storm events. Stormwater from higher, pervious areas flows to lower areas during storm events and then combines with coastal flood water to overwhelm stormwater infrastructure.

Infrastructure: Locations without generators or sufficient backup power were highlighted. Town facilities identified include: high school, senior center, library, and the civic center. Other locations noted were: senior housing, assisted living and other group residential facilities, and gas stations. Flooding concerns include the light department, light substations, and the airport. As noted above, the dams and downstream locations were also a key concern.

All of the coastal infrastructure was highlighted, including piers, seawalls, jetties and wharves. The Town's waste water pump stations, particularly the Dock Square station were noted as vulnerable, as well as the dams at Cape Pond and Carlson Quarry. Low lying stormwater infrastructure such as catch basins and culverts, as well as the Thacher Road Bridge were also noted. Water storage infrastructure was noted as lacking as well with some supporting the purchase of Johnson's Quarry to enlarge existing storage capacity. Some felt that the waste water treatment plant was vulnerable as it is located in an AE flooding zone while not within the coastal zone. There was concern over low lying electric lines and unsecured propane tanks. Other locations noted were: senior housing, and other group residential facilities, and gas stations.

Current Strengths and Assets

Rockport has a solid foundation of assets, services, people and infrastructure that will serve to enhance its resiliency through our changing climate. CRB participants highlighted these and sought to improve and enhance these with best practice resiliency efforts to ensure a vibrant future for their community. Assets identified by participants include:

Infrastructure

- Relatively clean environment- no industrial chemicals, wastes, extensive fuel depots, etc. that could be impacted by storm events.
- Three exit roads from town: Routes 127, 127A and Main Street; hike out using Dogtown trails.
- Commuter rail station not in flood zone.
- Partial offshore breakwater still exists and overall good condition of existing town breakwaters and jetties.
- Stormwater system has been separated from muni sewer system; no sewer overflows.
- New development stormwater fees funds improvement to stormwater system.
- Sewer pump stations have backup generators.
- All public safety and municipal buildings have backup generators.
- Town has Solar Panel Overlay District.
- Town is a state designated Green Community.
- Municipal buildings are relatively energy efficient.
- Rockport has an inter-municipal agreement with Gloucester in place regarding Long Beach.
- All public safety, DPW, WWTP and the Town school complex are considered safe from flooding.
- Carlson Reservoir Dam is seen to be in good condition.

Natural assets and ecosystem services.

- Approximately 61% (2826 acres) of Rockport is open space, much of it contiguous, providing habitat, cooling and water filtration; about 35% of this land is owned by the Town or by a non-profit organization, with the other 26% privately owned.
- Many shoreline areas are of granite or basalt and provide protection against erosion.
- The Town has lots of permeable or semi-permeable driveways, reducing runoff.
- The Town is located along the North Atlantic Flyway for migrating birds.
- There are many strong environmental and preservation non-profits such as MA Audubon, Essex County Greenbelt and the Trustees of Reservations that own and manage land in and near Rockport.
- Dogtown Common land is undeveloped.
- The marshes, beaches and other living shorelines are all outstanding resources.
- There is a high potential for wind energy.
- Rockport has a strong wetlands bylaw and regulations.

Societal

Current Strengths and Assets

- A small community with strong, overlapping social networks.
- Town residents highly aware of coastal vulnerability.
- The Code Red emergency notification system has a high degree of participation.
- Local farm provides local food source.
- Many community-wide activities.
- Lots of senior housing.
- Active Council on Aging and Elder Affairs Coordinator.
- Highly engaged and educated local community is an advantage in building resilience.
- Reverse 911 system.
- Strong Harbormaster Department and Coast Guard station nearby.
- Pigeon Cove Fishermen's Co-op.
- Thacher Island Association/South End Association
- Chamber of Commerce
- Nearby hospital: Addison Gilbert
- Regular communication between DPW, Police in Gloucester and Essex
- Strong ties to Red Cross/MEMA/FEMA

Top Recommendations to Improve Resilience

Following the initial assessment of vulnerabilities and strengths, each small group was asked to determine climate resilience actions to address vulnerabilities and then determine the top three actions for each category.At the end of the workshop, participants gathered as a large group to report on their top resiliency actions for each of the three categories: infrastructure, societal, and environment. These actions were documented and combined when appropriate on posters. Participants then voted using green dots on their top three resiliency actions from the large group's collated actions. Appendix B illustrates the voting results. From this exercise, the Rockport CRB participants designated the following as their top priority actions:

<u>Infrastructure</u>

- Conduct a comprehensive Town-wide sea level rise and resiliency study with an emphasis on mapping all threatened structures and infrastructure. Assess Town roads and culverts and drainage system for resiliency. Determine what floods and when and determine what needs to be updated or replaced.
- Increase water supply resiliency by revisiting the option of purchasing Johnson's Quarry.
- Make sure that all sewer pump stations are adequately protected against flooding.

<u>Society</u>

- Educate the community regarding emergency management response. Work with existing Town staff, committees and area organizations to provide outreach and events informing Town residents of how to prepare and respond to emergency events.
- Coordinate closely with Gloucester on all emergency preparation and response planning.

- Expand the capacity of the existing Code Red emergency communications system and ensure that all residents are signed up.

Environment

- Re-evaluate existing stormwater, wetlands and zoning bylaws. Ensure bylaws address coastal climate resilience problems, water quality issues, and green infrastructure opportunities for stormwater management.
- Conduct an comprehensive drinking water supply study that takes climate change impacts into effect and looks at a broad range of supply strategies.
- Provide education on the roles of barrier beaches and coastal processes in providing climate resilience; seek funding for Living Shoreline and beach nourishment projects.

Appendix C contains the risk matrices from the CRB Workshop Small Group, which includes vulnerabilities, strengths, actions, prioritization, and time frame. Table 2 summarizes participants' other recommended priority actions for climate resiliency beyond the top three listed above, ranked by number of votes received.

Table 2. Summary of Other Top Actions for Resiliency

Category	Resiliency Action	Votes
Infrastructure	Storm-proof Dock Square pumping station	3
Infrastructure	Communicate with Gloucester for emergency road access off Cape Ann.	3
Infrastructure	Assess overall municipal sewer capacity.	1
Infrastructure	Extend Granite Pier seawall to Gull Island	1
Societal	Conduct outreach to the community on climate mitigation and energy efficiency opportunities	2
Societal	Conduct specific public education on sea level rise and climate change to seniors and those in public housing.	0
Societal	Conduct specific public education on climate risk and severe weather preparation for non-English or ESL residents	0
Environmental	Maintain access to beaches: work with land owners on climate resilience.	4

Environmental	Regulate impervious surfaces: update stormwater bylaw.	3

Category	**Resiliency Action**	**Votes**
Environmental	Town: Provide more renewable sources for energy.	1

CRB Workshop Participants

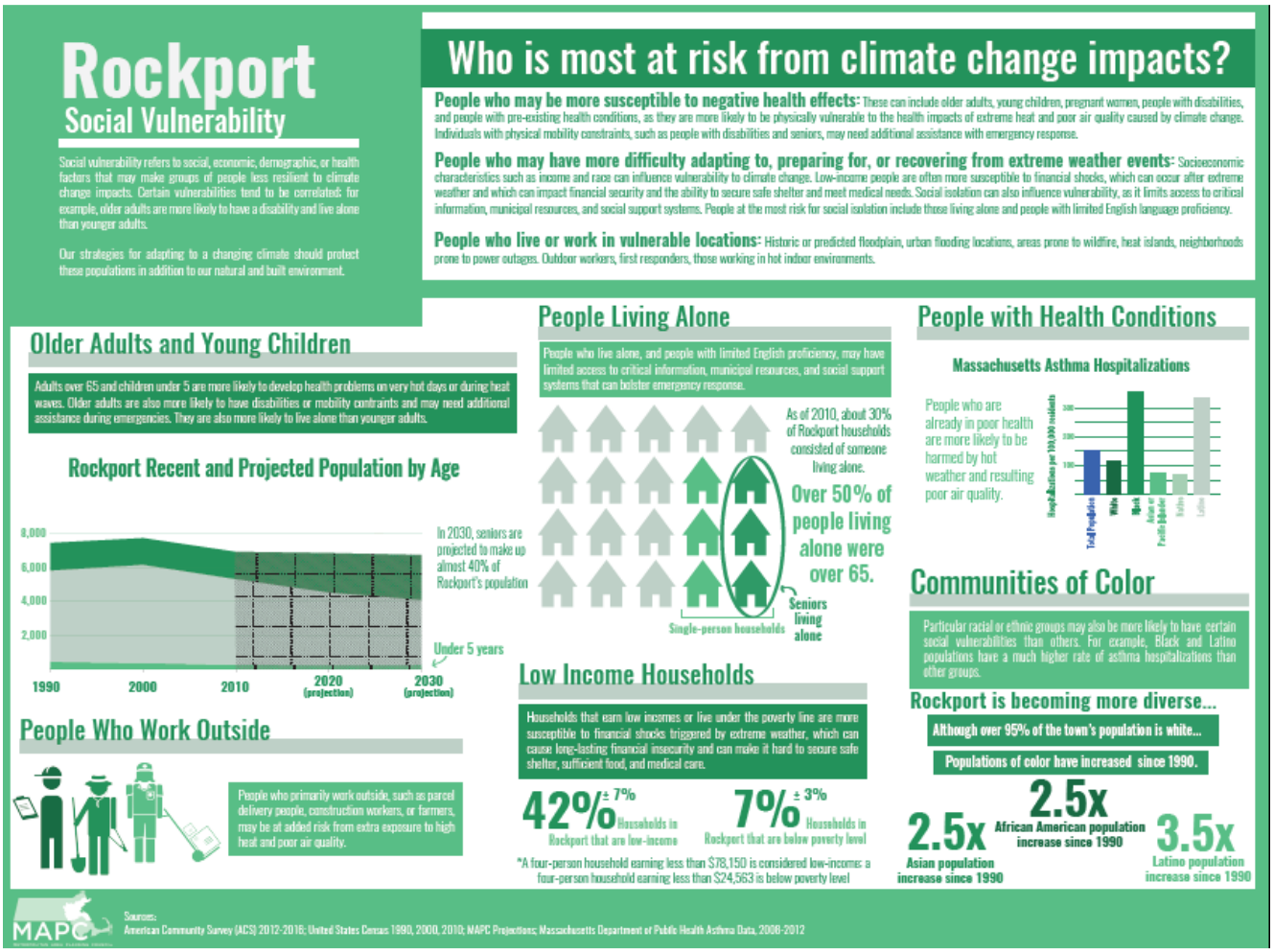
MAPC worked with the core team to create a modified CRB participant worksheet which built an invitation list of approximately 35 potential attendees with a wide representation across loca/state government, Town staff, non-profits, local business and utilities.

The Town Administrator wrote an invitation which was sent as an attachment via email. The invitation described the day's events. One week prior to the workshop, Rockport called invitees personalize the RSVP process. Personal telephone calls were instrumental in getting those who had not committed to attend.

First	Last	Affiliation	Table
Tom	Minkus	Rights of Way Committee	Red
Chief	Horvath	Police	Green
Cynthia	Carr	Housing Authority	Blue
Denise	Donnelly	Board of Selectmen	Red
Eric	Hutchens	Resident	Green
Edward	Hand	Planning Board	Blue
Rich	Souza	DPW	Red
Joe	Parisi	DPW Director	Green
Don	Greel	DPW	Blue
Bruce	Reed	DPW Commissioner	Red
Mitch	Vieira	Town Administrator	Green
Gerri	Falco	Conservation Agent	Blue
Sarah	Laursa	Conservation Commission	Green
Mike	Gallota	Rockport GIS Manager	Blue

Kirk	Baker	Town Planner	Red
Hank	Betts	Planning Board	Green
Lt.	Marino	Police	Blue
Paul	Orlando	Building Inspector	Red
Rosemary	Lesch	Harbormaster	Green
Scott	Story	Harbormaster	Blue
Jim	Doyle	Rockport Fire Dept	Green
Katherine	Glenn	MA Coastal Zone Managment	Blue
Sarah	Russell	Board of Heath	Red

Appendix A – Rockport Climate Change Information Posters



Rockport

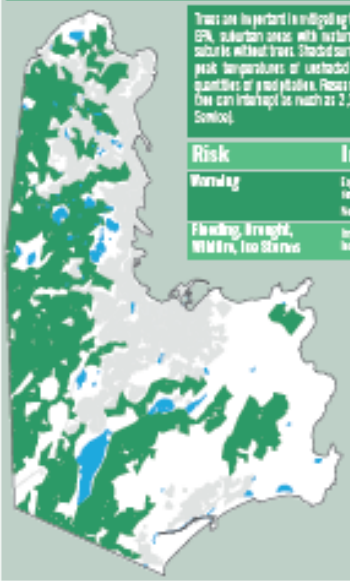
Natural Resources

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

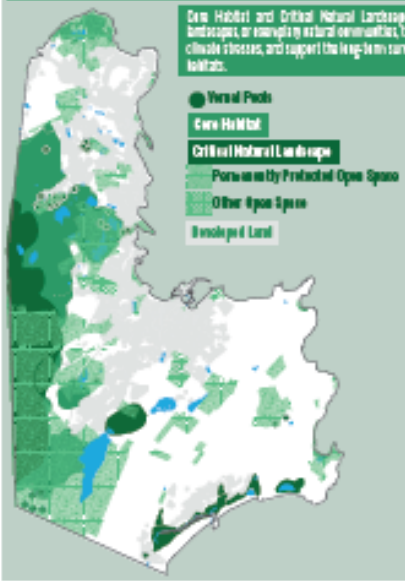
Trees are important in mitigating the impact of heat waves. According to the EPA, suburban areas with mature trees are 4-6 degrees cooler than new suburbs without trees. Shaded surfaces can be 25-40 degrees cooler than the peak temperatures of unshaded surfaces. Trees also absorb remarkable quantities 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).

Risk	Impact
Warming	Expected to shift forest type from Maple-Birch-Beech forest to Oak/Hickory forest similar to New Jersey. New pests and diseases
Flooding, Drought, Wildfire, Ice Storms	Impaired water, toxic exposure, contaminant loading



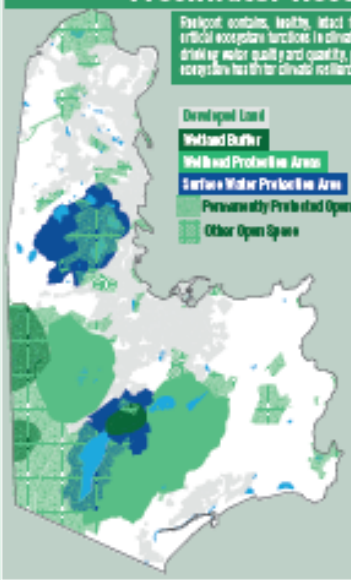
Valuable Habitat

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



Freshwater Resources

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

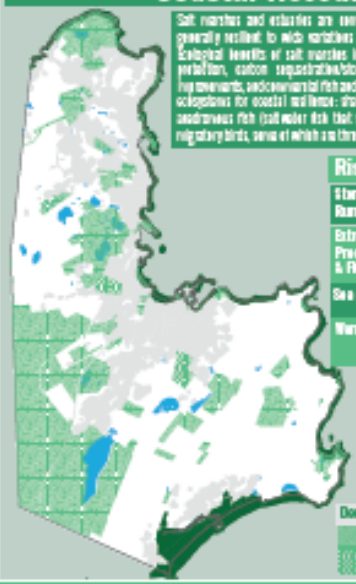


Risk	Impact
Drought/ Warming	Seasonal no-flow/low-flow; reduced absorption capacity; diminished habitat for; algal blooms; loss of wetland acreage; reduced drinking water supply
Flooding	Impaired water; toxic exposure; contaminant loading
Extreme Precipitation	Scouring; impaired water; water overflow;

Coastal Resources

Salt marshes and estuaries are complex and highly productive ecosystems generally resilient to wide variations in temperature, salinity, and inundation. Ecological benefits of salt marshes include: floodwater storage, storm surge protection, carbon sequestration/storage, nutrient removal, water quality improvements, and environmental fish and shellfish habitat. Coastal bays host critical ecosystems for coastal resilience: shellfish growing areas, salt grass meadows, anadromous fish (salt water fish that spawn in fresh water), and resident and migratory birds, some of which are threatened and endangered.

Risk	Impact
Stormwater Runoff	Threatens to pollute salt marshes
Extreme Precipitation & Flooding	Extreme storms threaten to harm salt marshes; flooding increases non-point pollution to bays
Sea level rise	Potential saltwater inundation to salt marshes
Warming	Invasive species migrate to environments; ocean acidification



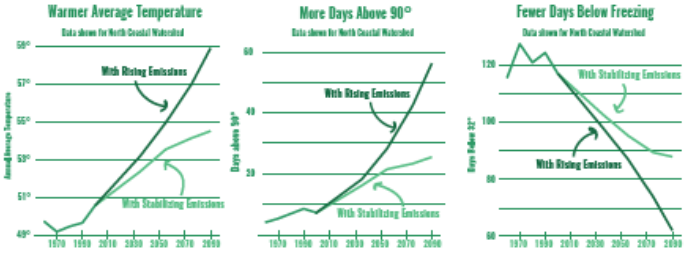
Sources:
MassGIS (Bureau of Geographic Information); BioMap 2: Conserving the Biodiversity of Massachusetts in a Changing World; Massachusetts Department of Fish and Game; Massachusetts Department of Environmental Protection; MassGIS (Bureau of Geographic Information); National Land Cover Database (NLCD)

Climate Change

Rockport and the North Coastal Watershed

Our climate is regulated by "greenhouse gases (GHGs)" that trap heat, including carbon dioxide, methane, and nitrous oxide. In the past century, the combustion of fossil fuels, our primary energy source in the age of industrialization, has increased the concentration of GHGs in the atmosphere, which has caused global temperatures to rise. If people stabilize GHG emissions, global temperatures may rise more slowly. If emissions continue increasing at the same rate, we can expect more extreme changes in the climate.

Higher Temperatures



As the climate changes, Rockport can expect...

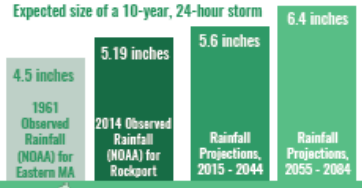
More Large Storm Events

In addition to increasing annual precipitation, climate change will bring more large rain and snow events.

This will lead to more stormwater flooding, as most stormwater drainage is not sized for larger rain events.

10-year, 24 hour storms refer to the 24-hour rainfall total for the biggest storm expected in a 10-year period.

Storm drains built for 1961 standards will be inadquate



More Annual Precipitation

But less in the summer and fall...

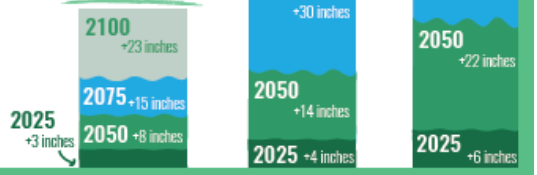
While total annual rainfall and large rainfall events are projected to increase, summer and fall rain is projected to decrease slightly.

And more frequent droughts...

Due to the combined effects of earlier snowmelt, less rain, and higher temperatures, summer and fall droughts may become more frequent.

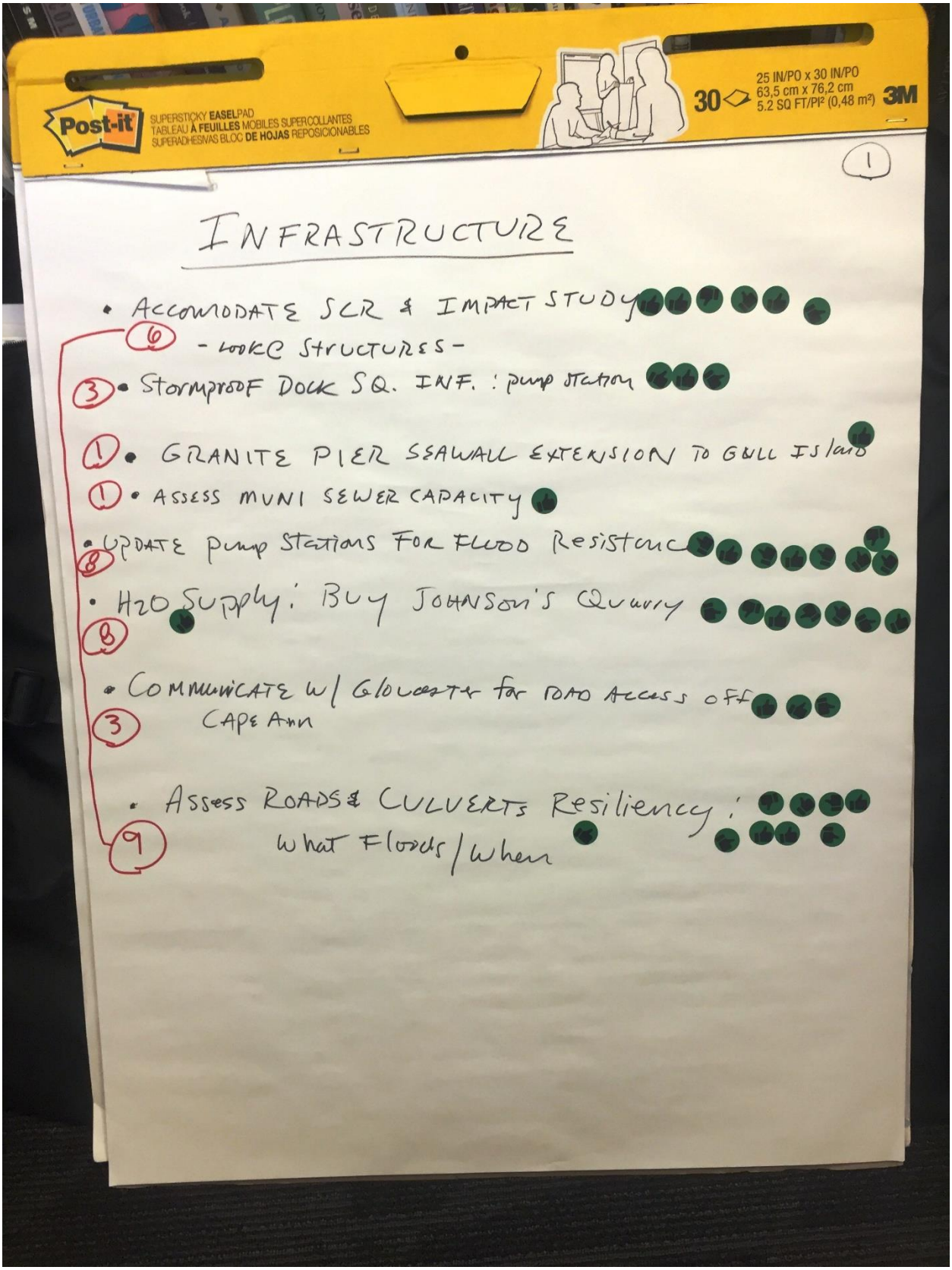
Rising Seas

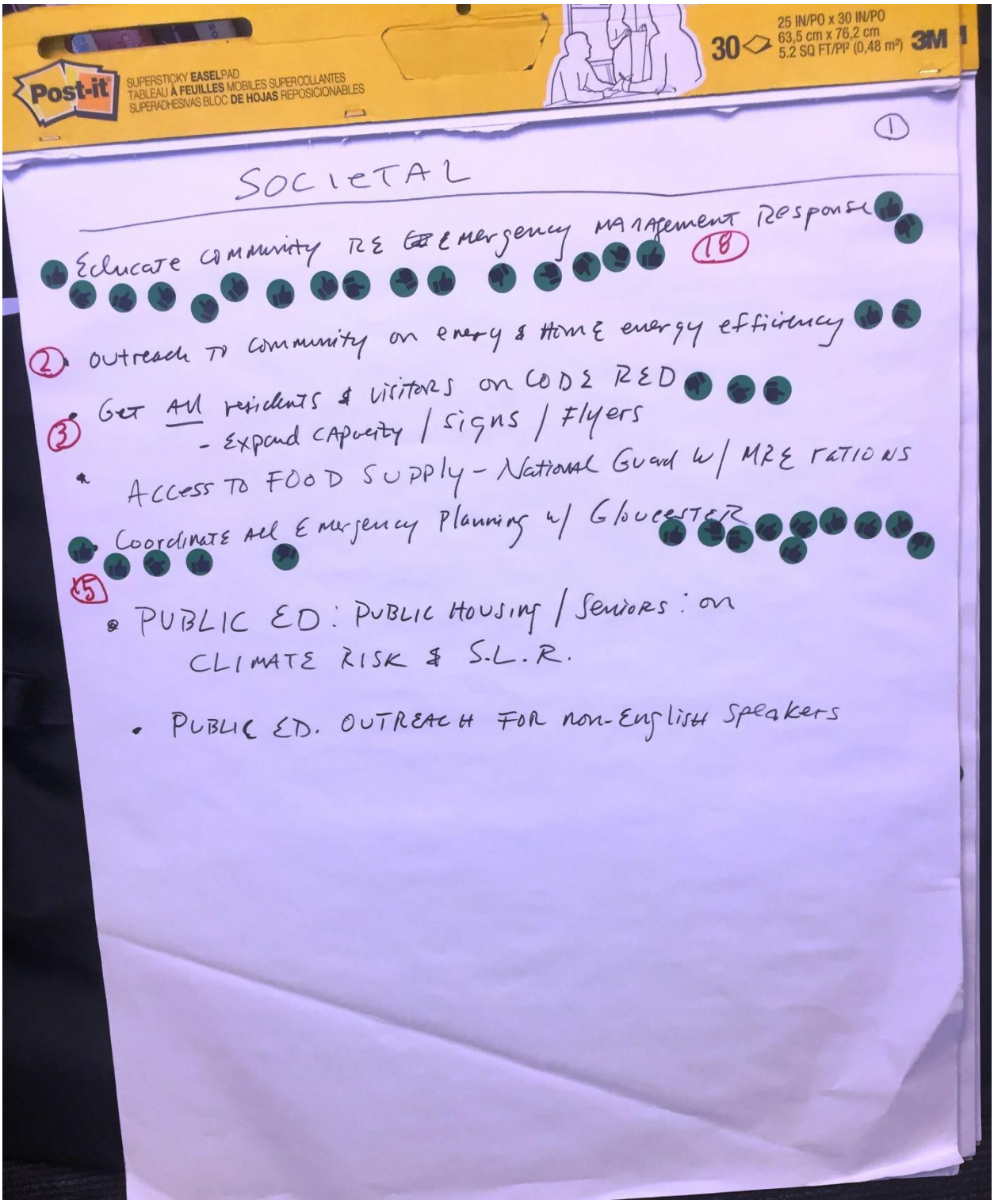
Projections for sea level rise vary dramatically depending on future greenhouse gas emissions, melting ice in the arctic, ocean currents, and other factors. The charts below represent intermediate low, intermediate high, and high sea level rise scenarios.

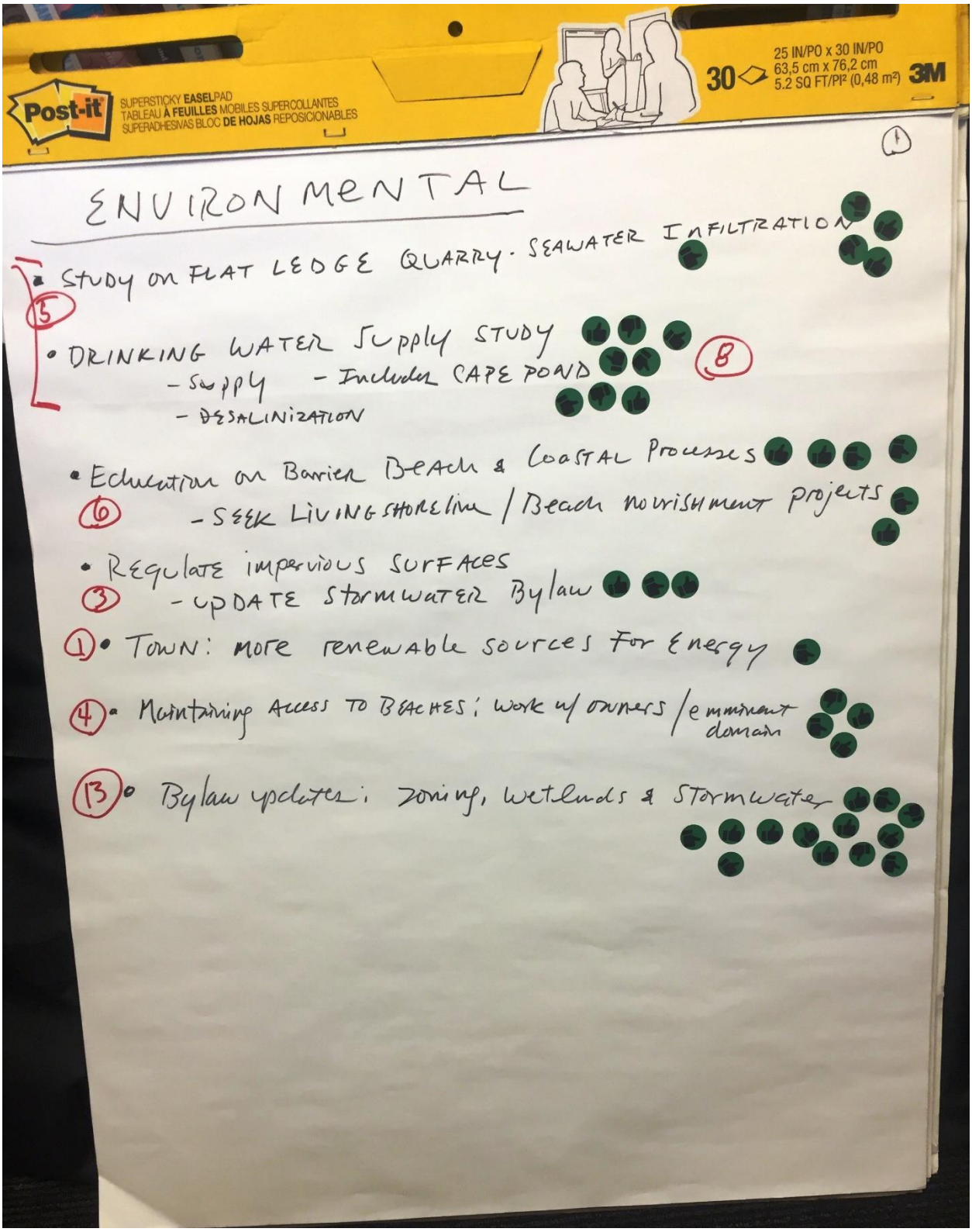


Sources:
Massachusetts Executive Office of Energy and Environmental Affairs; Northeast Climate Science Center; National Ocean and Atmospheric Administration TP 40; National Ocean and Atmospheric Administration Atlas 14; Cambridge CCVA as cited by Boston Research Advisory Group 2016; Massachusetts Office of Coastal Zone Management, "Sea Level Rise: Understanding and Applying Trends and Future Scenarios for Analysis and Planning 2013

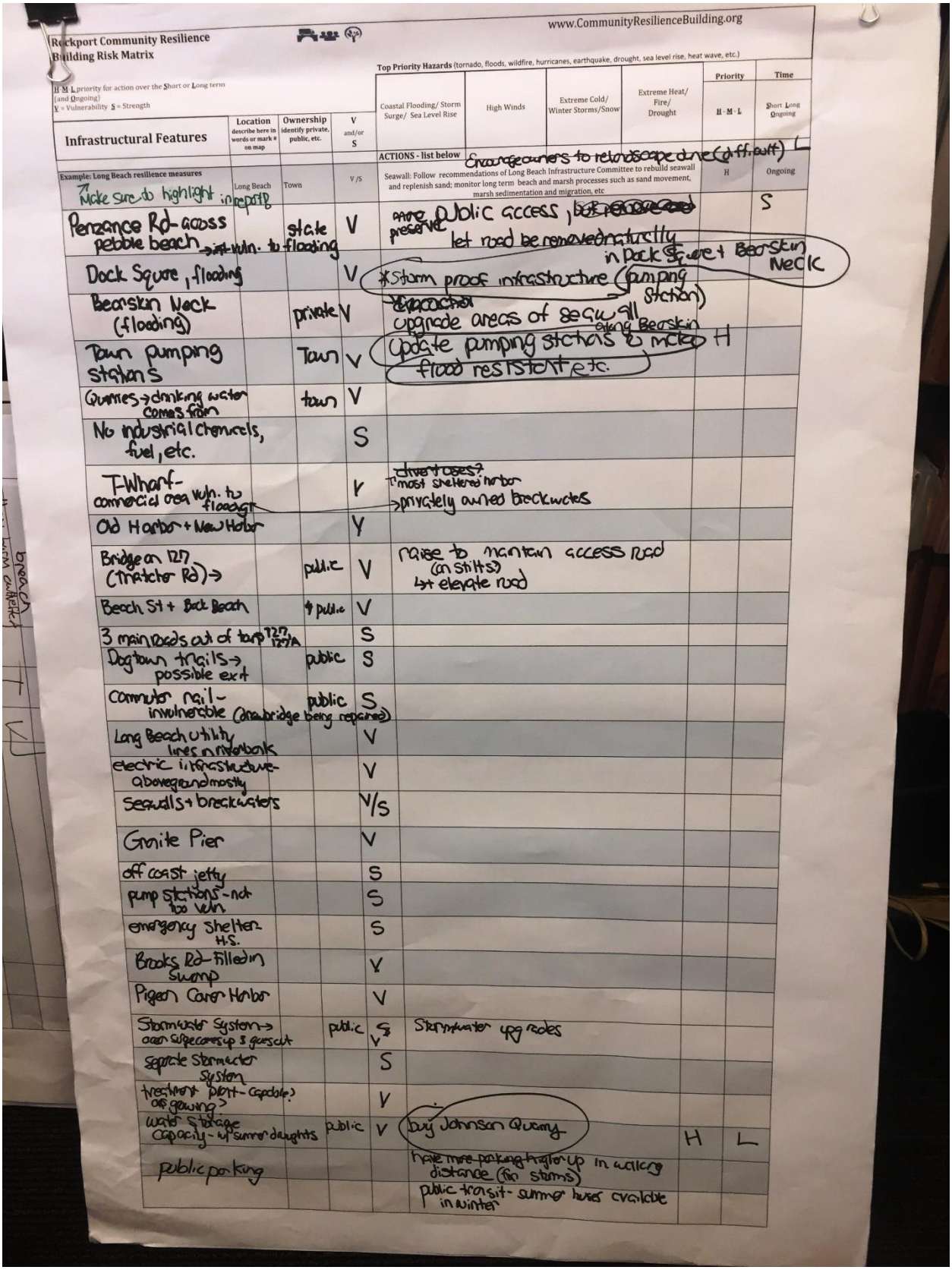
Appendix B –Top Priority Actions Voting Results




Post-it
SUPERSTICKY EASELPAD
TABLEAU À FEUILLES MOBILES SUPERCOLLANTES
SUPERADHESIVAS BLOC DE HOJAS REPOSICIONABLES
30
25 IN/PO x 30 IN/PO
63,5 cm x 76,2 cm
5.2 SQ FT/PI² (0,48 m²)
3M
(1)
SOCIETAL
Educate community re Emergency management response
(18)
(2) outreach to community on energy & Home energy efficiency
(3) Get All residents & visitors on CODE RED
- Expand capacity / signs / flyers
• Access to FOOD SUPPLY - National Guard w/ MRE rations
Coordinate Act Emergency Planning w/ Gloucester
(5)
• PUBLIC ED: PUBLIC HOUSING / Seniors: on CLIMATE RISK & S.L.R.
• PUBLIC ED. OUTREACH FOR non-English Speakers



Appendix C-CRB Workshop Risk Matrices

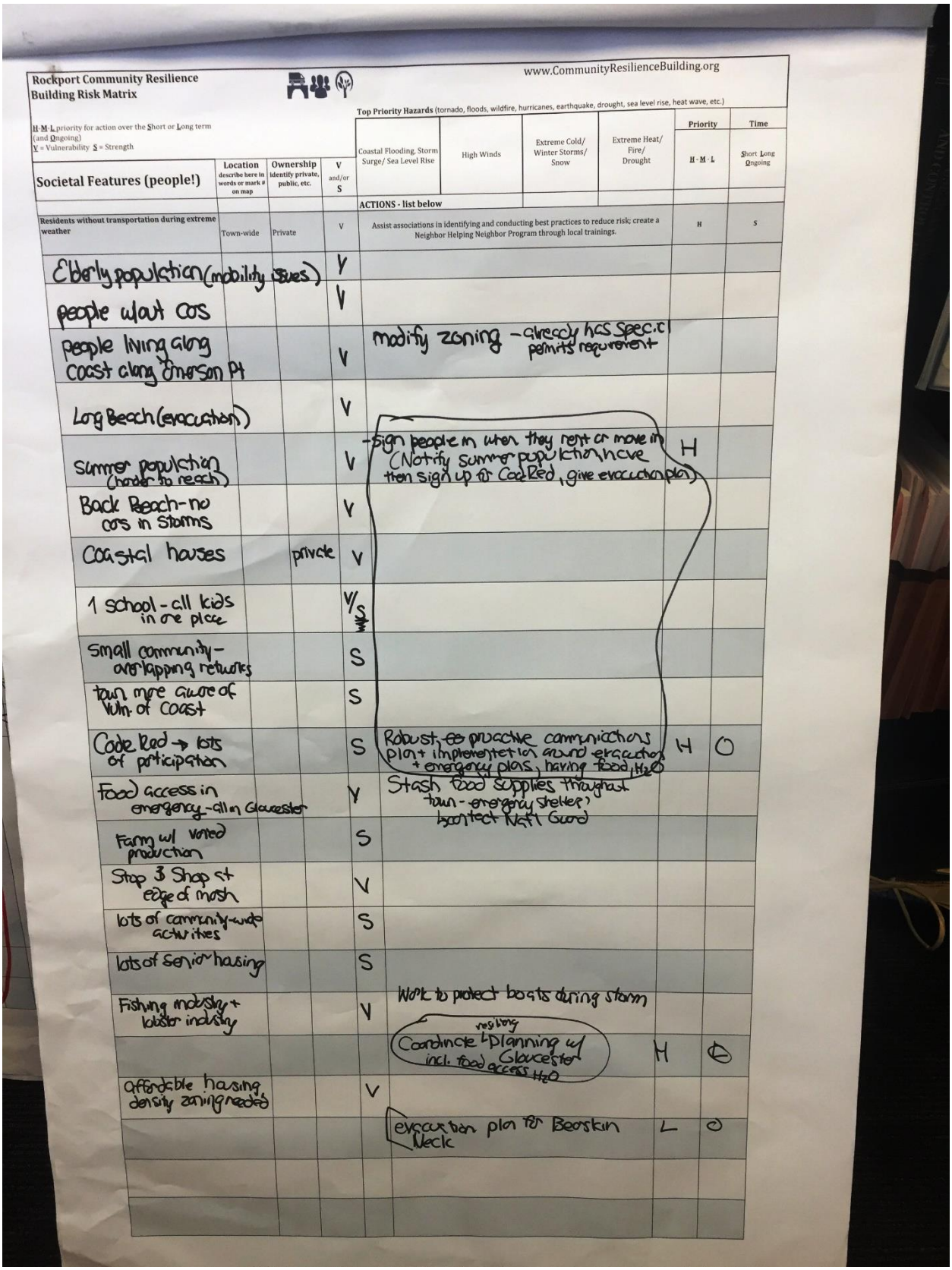


Rockport Community Resilience Building Risk Matrix — www.CommunityResilienceBuilding.org

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.)

Infrastructural Features	Location describe here in words or mark # on map	Ownership identify private, public, etc.	V and/or S	Coastal Flooding/ Storm Surge/ Sea Level Rise	High Winds	Extreme Cold/ Winter Storms/Snow	Extreme Heat/ Fire/ Drought	Priority H-M-L	Time Short Long Ongoing
				ACTIONS - list below	Encourage owners to retrofit/ landscape drive (diff. surf)				
Example: Long Beach resilience measures (Make sure to highlight in report)	Long Beach	Town	V/S	Seawall: Follow recommendations of Long Beach Infrastructure Committee to rebuild seawall and replenish sand; monitor long term beach and marsh processes such as sand movement, marsh sedimentation and migration, etc				H	Ongoing
Penzance Rd - across pebble beach → infrastr. to flooding		state	V	more public access, preserve					S
				let road be removed naturally					
Dock Square, flooding			V	*Storm proof infrastructure (pumping station) in Dock Square + Bearskin Neck					
Bearskin Neck (flooding)		private	V	encroachment upgrade areas of seawall along Bearskin					
Town pumping stations		Town	V	Update pumping stations & make flood resistant etc.				H	
Quarries → drinking water comes from		town	V						
No industrial chemicals, fuel, etc.			S						
T-Wharf - commercial area infrastr. to flooding			V	divert cases? most sheltered harbor → privately owned breakwaters					
Old Harbor + New Harbor			V						
Bridge on 127 (Tractor Rd) →		public	V	raise to maintain access road (on stilts) & elevate road					
Beach St + Back Beach		public	V						
3 main roads out of town 127, 127A			S						
Dogtown trails → possible exit		public	S						
Commuter rail - invulnerable (one bridge being repaired)		public	S						
Long Beach utility lines on riverbank			V						
electric infrastructure - aboveground mostly			V						
Seawalls + breakwaters			V/S						
Granite Pier			V						
off coast jetty			S						
pump stations - not too vuln			S						
emergency shelter H.S.			S						
Brooks Rd - filled in swamp			V						
Pigeon Cove Harbor			V						
Stormwater System → open subcoves up & gusset		public	S V	Stormwater upgrades					
Separate Stormwater System			S						
treatment plant - capable? offgassing?			V						
water storage capacity - w/ summer droughts		public	V	buy Johnson Quarry				H	L
public parking				have more parking higher up in walking distance (for storms)					
				public transit - summer buses available in winter					



Rockport Community Resilience Building Risk Matrix

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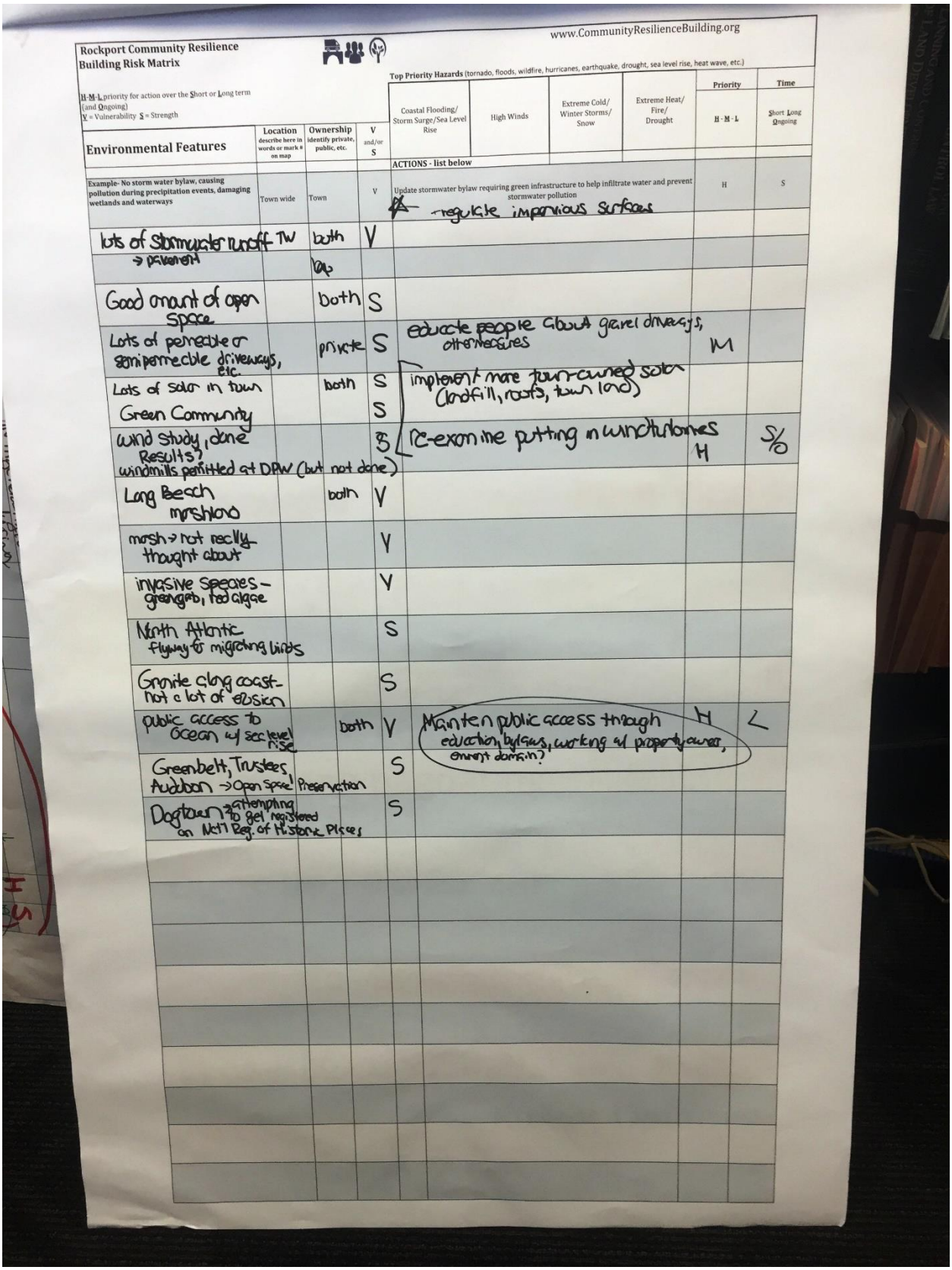
Top Priority Hazards (tornado, floods, wildfire, hurricanes, earthquake, drought, sea level rise, heat wave, etc.)

Societal Features (people!)	Location describe here in words or mark # on map	Ownership identify private, public, etc.	V and/or S	Coastal Flooding, Storm Surge/ Sea Level Rise	High Winds	Extreme Cold/ Winter Storms/ Snow	Extreme Heat/ Fire/ Drought	Priority H-M-L	Time S Short L Long O Ongoing
				ACTIONS - list below					
Residents without transportation during extreme weather	Town-wide	Private	V	Assist associations in identifying and conducting best practices to reduce risk; create a Neighbor Helping Neighbor Program through local trainings.				H	S
Elderly population (mobility issues)			V						
people w/out cars			V						
people living along coast along Emerson Pt			V	modify zoning - already has Specific permits requirement					
Long Beach (evacuation)			V						
summer population (harder to reach)			V	sign people in when they rent or move in (Notify summer population in cve then sign up for CodeRed, give evacuation plan)				H	
Back Beach - no cars in storms			V						
Coastal houses		private	V						
1 school - all kids in one place			V/S						
small community - overlapping networks			S						
town more aware of Wm. of coast			S						
CodeRed → lots of participation			S	Robust, pro-active communications plan + implementation around evacuation + emergency plans, having food, H2O				H	O
Food access in emergency - all in Gloucester			V	Stash food supplies throughout town - emergency shelter? boat to Kett Cove					
Farm w/ varied production			S						
Stop & Shop at edge of marsh			V						
lots of community-wide activities			S						
lots of senior housing			S						
Fishing industry + lobster industry			V	Work to protect boats during storm					
				resiliency Coordinate & Planning w/ Gloucester incl. food access H2O				H	O
affordable housing, density zoning needed			V						
				evacuation plan for Bearskin Neck				L	O



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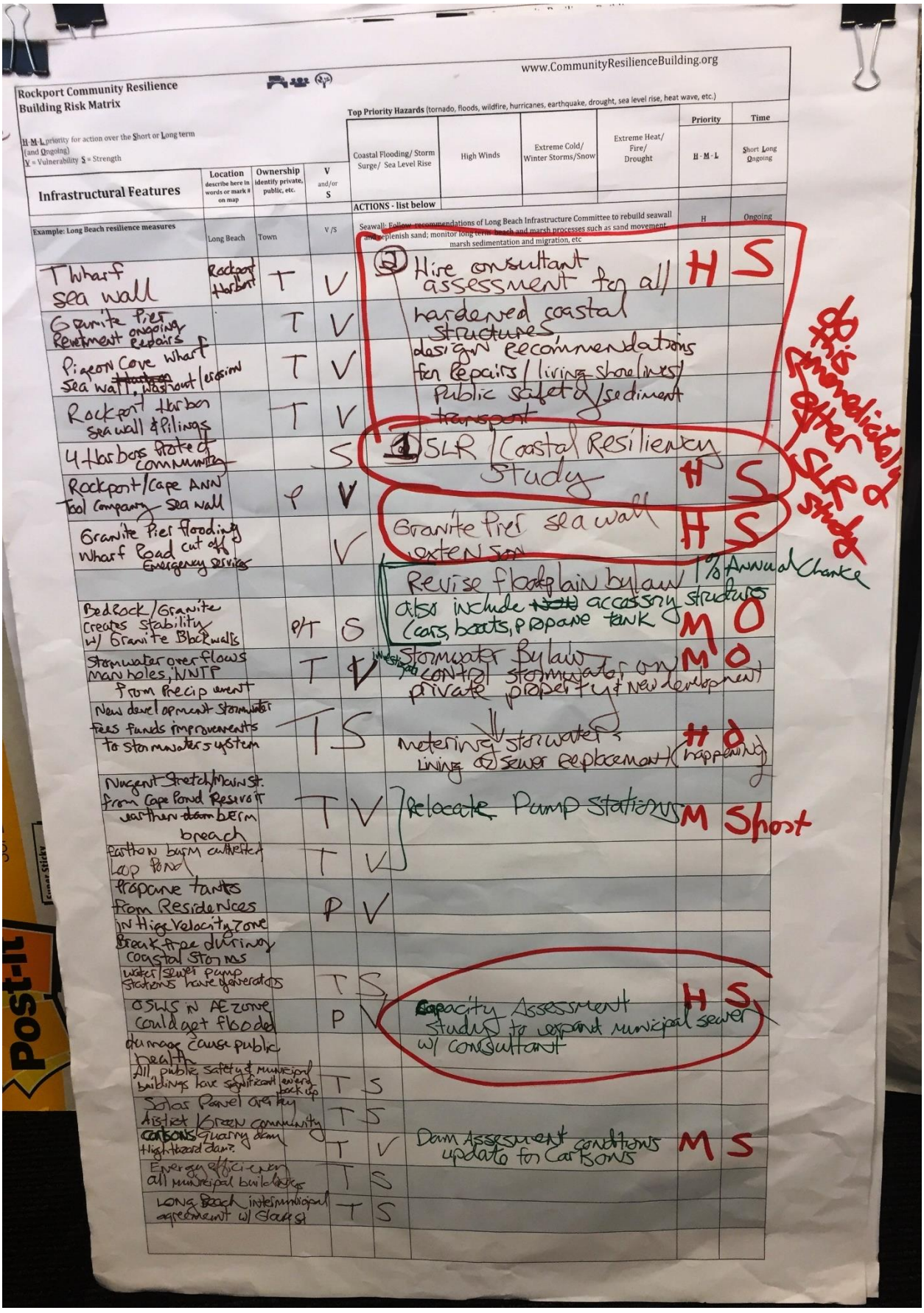
Environmental Features	Location describe here in words or mark # on map	Ownership identify private, public, etc.	V and/or S	Coastal Flooding/ Storm Surge/Sea Level Rise	High Winds	Extreme Cold/ Winter Storms/ Snow	Extreme Heat/ Fire/ Drought	Priority H-M-L	Time Short Long Ongoing
				ACTIONS - list below					
Example- No storm water bylaw, causing pollution during precipitation events, damaging wetlands and waterways	Town wide	Town	V	Update stormwater bylaw requiring green infrastructure to help infiltrate water and prevent stormwater pollution				H	S
lots of stormwater runoff TW → pavement		both	V	~~-regulate impervious surfaces~~					
		bap							
Good amount of open space		both	S						
Lots of permeable or semipermeable driveways, etc.		private	S	educate people about gravel driveways, other measures				M	
Lots of solar in town		both	S	implement more town-owned solar (landfill, roofs, town land)					
Green Community			S						
wind study, done Results? windmills permitted at DPW (but not done)			S	re-examine putting in windturbines				H	S/O
Long Beach marshland		both	V						
marsh → not really thought about			V						
invasive species - greenhead, red algae			V						
North Atlantic flyway for migrating birds			S						
Granite along coast- not a lot of erosion			S						
public access to ocean w/ sea level rise		both	V	Maintain public access through education, bylaws, working w/ property owner, eminent domain?				H	L
Greenbelt, Trustees, Audubon → Open Space Preservation			S						
Dogtown → attempting to get registered on Nat'l Reg. of Historic Places			S						



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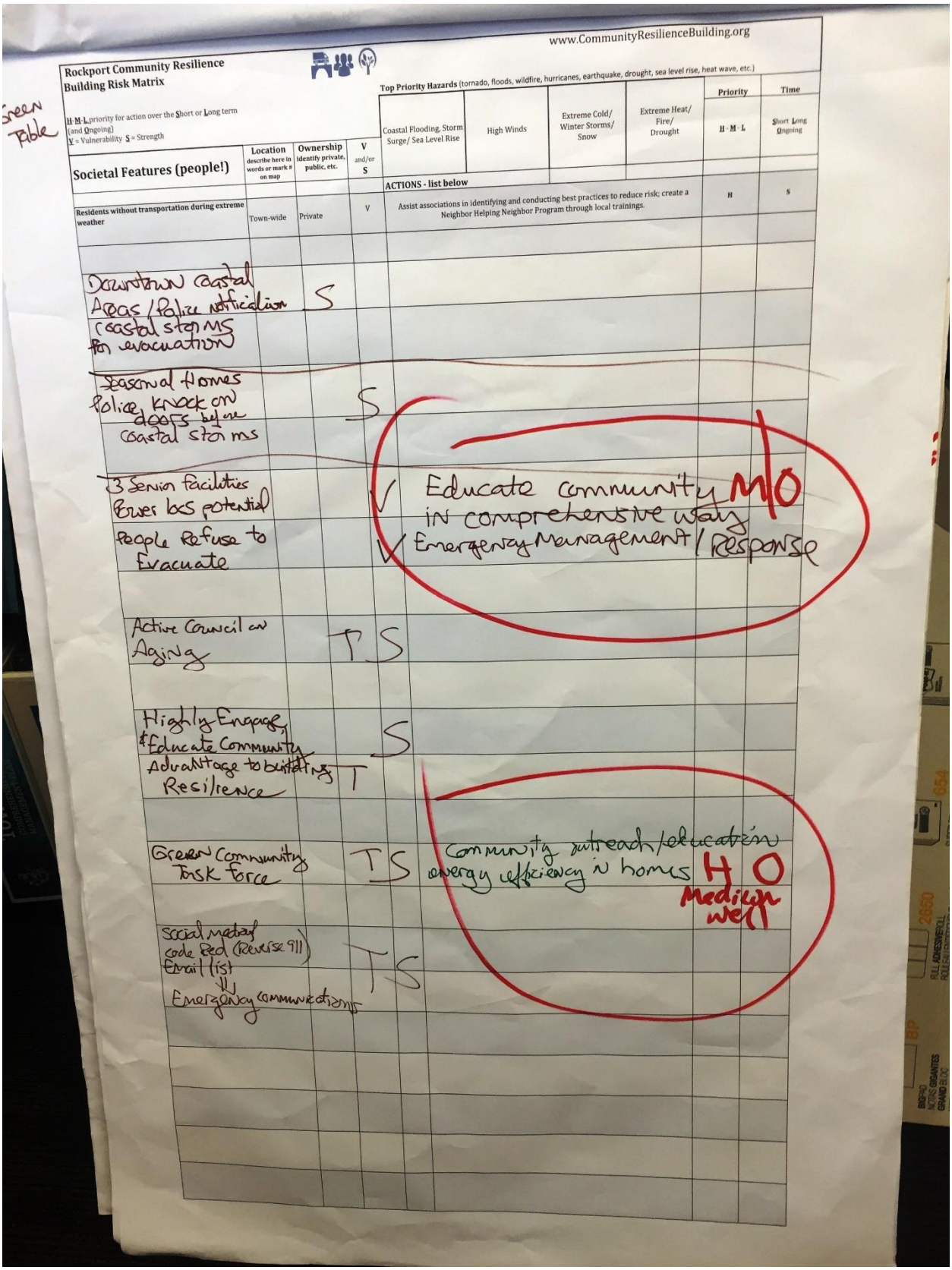
Example: Long Beach resilience measures	Long Beach	Town	V /S	Seawall: Follow recommendations of Long Beach Infrastructure Committee to rebuild seawall and replenish sand; monitor long term beach and marsh processes such as sand movement marsh sedimentation and migration, etc				H	Ongoing
T Wharf sea wall	Rockport Harbor	T	V	① Hire consultant assessment for all hardened coastal structures design recommendations for Repairs / living shorelines/ Public safety & sediment transport				H	S
Granite Pier ongoing Revetment repairs		T	V						
Pigeon Cove Wharf Sea wall, washout/erosion		T	V						
Rockport Harbor Sea wall & Pilings		T	V						
4 harbors protect community			S	② SLR Coastal Resiliency Study				H	S
Rockport/Cape ANN Tool Company Sea wall		P	V						
Granite Pier flooding Wharf Road cut off Emergency services			V	Granite Pier sea wall extension				H	S
				Revise floodplain bylaw also include accessory structures (cars, boats, propane tank				M	1% Annual Chance O
Bedrock/Granite Creates Stability w/ Granite Blockwalls		P/T	S						
Stormwater overflows manholes, WWTF from Precipitation		T	V	Stormwater Bylaw to control stormwater on private property of new development				M	O
New development stormwater fees funds improvements to stormwater system		T	S	metering stormwater & Lining & sewer replacement				M	O happening
Nugent Stretch/Main St. from Cape Pond Reservoir earthen dam berm breach		T	V	Relocate Pump Stations				M	Short
Earthen berm outlet of Loop Pond		T	V						
Propane tanks from Residences in High Velocity Zone		P	V						
Break-Pipe during Coastal Storms									
Water/Sewer pump Stations have generators		T	S						
OSWS in AE zone could get flooded damage cause public health		P	V	Capacity Assessment study to expand municipal sewer w/ consultant				H	S
All public safety & municipal buildings have significant energy back up		T	S						
Solar Panel array by district Green community		T	S						
CARBONS Quarry dam high hazard dam?		T	V	Dam Assessment conditions update for CarBONS				M	S
Energy efficiency all municipal buildings		T	S						
LONG Beach inter-municipal agreement w/ Gloucester		T	S						

Post-it



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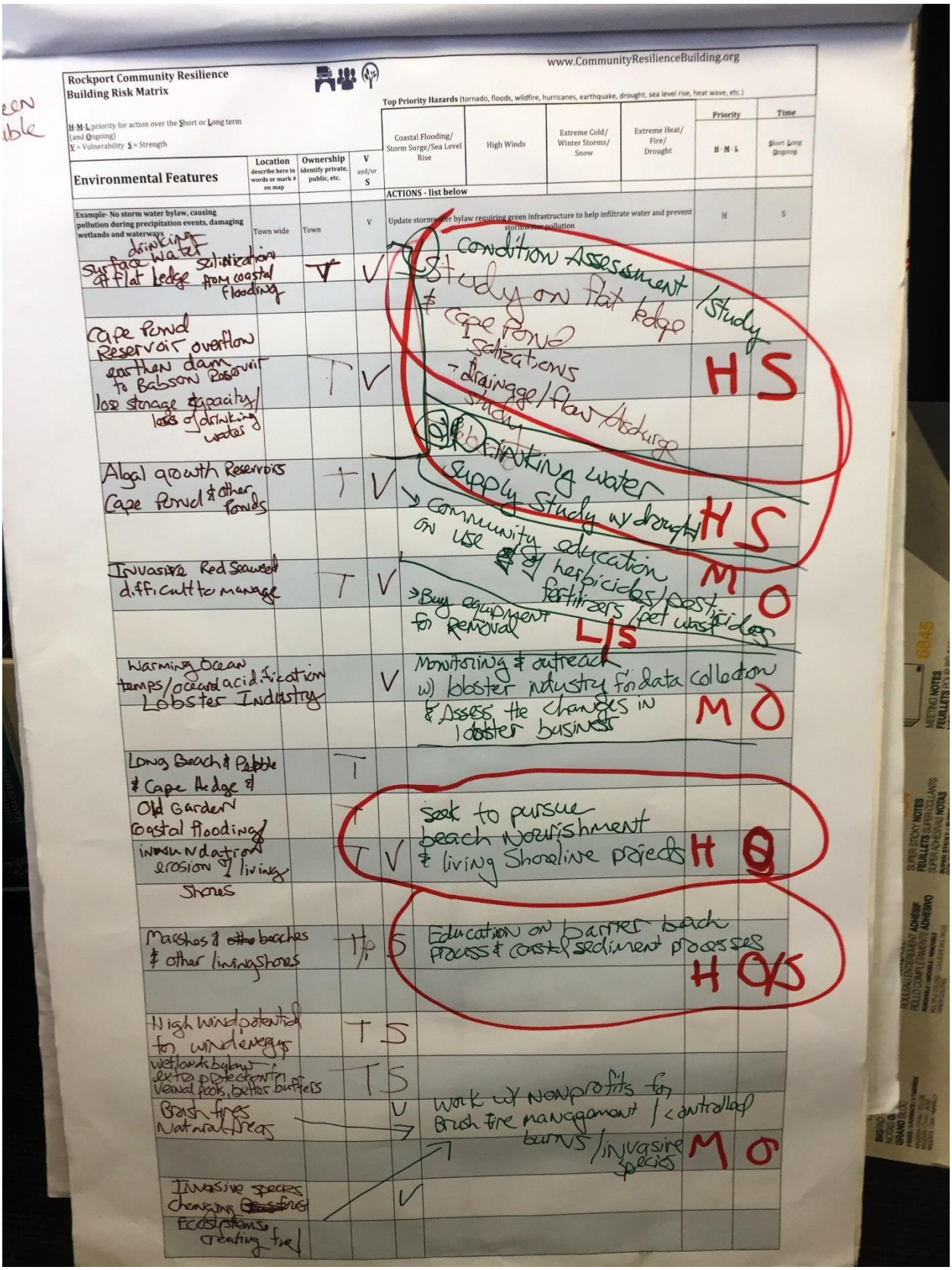
				ACTIONS - list below					
Residents without transportation during extreme weather	Town-wide	Private	V	Assist associations in identifying and conducting best practices to reduce risk; create a Neighbor Helping Neighbor Program through local trainings.				H	S
Downtown coastal Areas / Police notification coastal storms for evacuation			S						
Seasonal Homes Police knock on doors before coastal storms			S						
3 Senior facilities Power loss potential			V	Educate community in comprehensive way Emergency Management / Response				M/O	
People Refuse to Evacuate			V						
Active Council on Aging			T S						
Highly Engage & Educate Community Advantage to building Resilience			S T						
Green Community Task force			T S	community outreach/education energy efficiency in homes				H O Medium well	
Social media code Red (Reverse 911) Email list Emergency communications			T S						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Coastal Flooding/ Storm Surge/Sea Level Rise
High Winds
Extreme Cold/ Winter Storms/ Snow
Extreme Heat/ Fire/ Drought
Priority
Time
H-M-L priority for action over the Short or Long term (and Ongoing)
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Location describe here in words or mark # on map
Ownership identify private, public, etc.
V and/or S
ACTIONS - list below
Example- No storm water bylaw, causing pollution during precipitation events, damaging wetlands and waterways
Town wide
Town
V
Update stormwater bylaw requiring green infrastructure to help infiltrate water and prevent stormwater pollution
H
S
drinking
Surface water
flat ledge
salinization from coastal flooding
V
V
Condition Assessment
Study on flat ledge
/Study
Cape Pond
Reservoir overflow
earthen dam to Babson Reservoir
loss storage capacity/ loss of drinking water
T
V
Cape Pond salinizations
- drainage/flow/discharge
study
H S
Drinking water
Algal growth Reservoirs
Cape Pond & other Ponds
T
V
supply Study w/ drought
Community education
on use of herbicides/pesticides fertilizers/pet waste
H S
M O
Invasive Red Seaweed
difficult to manage
T
V
Buy equipment for removal
L/S
Warming Ocean temps/ocean acidification
Lobster Industry
V
Monitoring & outreach w/ lobster industry for data collection & Assess the changes in lobster business
M O
Long Beach & Pebble & Cape Hedge &
Old Garden
coastal flooding/ inundation erosion & living Shores
T
T
V
seek to pursue beach nourishment & living Shoreline projects
H O
Marshes & other beaches & other livingshores
H/L
S
Education on barrier beach process & coastal sediment processes
H O/S
High wind potential for wind energy
T
S
wetlands bylaw extra protections/ Vernal pools, better buffers
T
S
Brush fires
Natural fires
V
Work w/ NONprofits for Brush fire management / controlled burns/ invasive species
M O
Invasive species changing forest
Ecosystems creating fuel
V