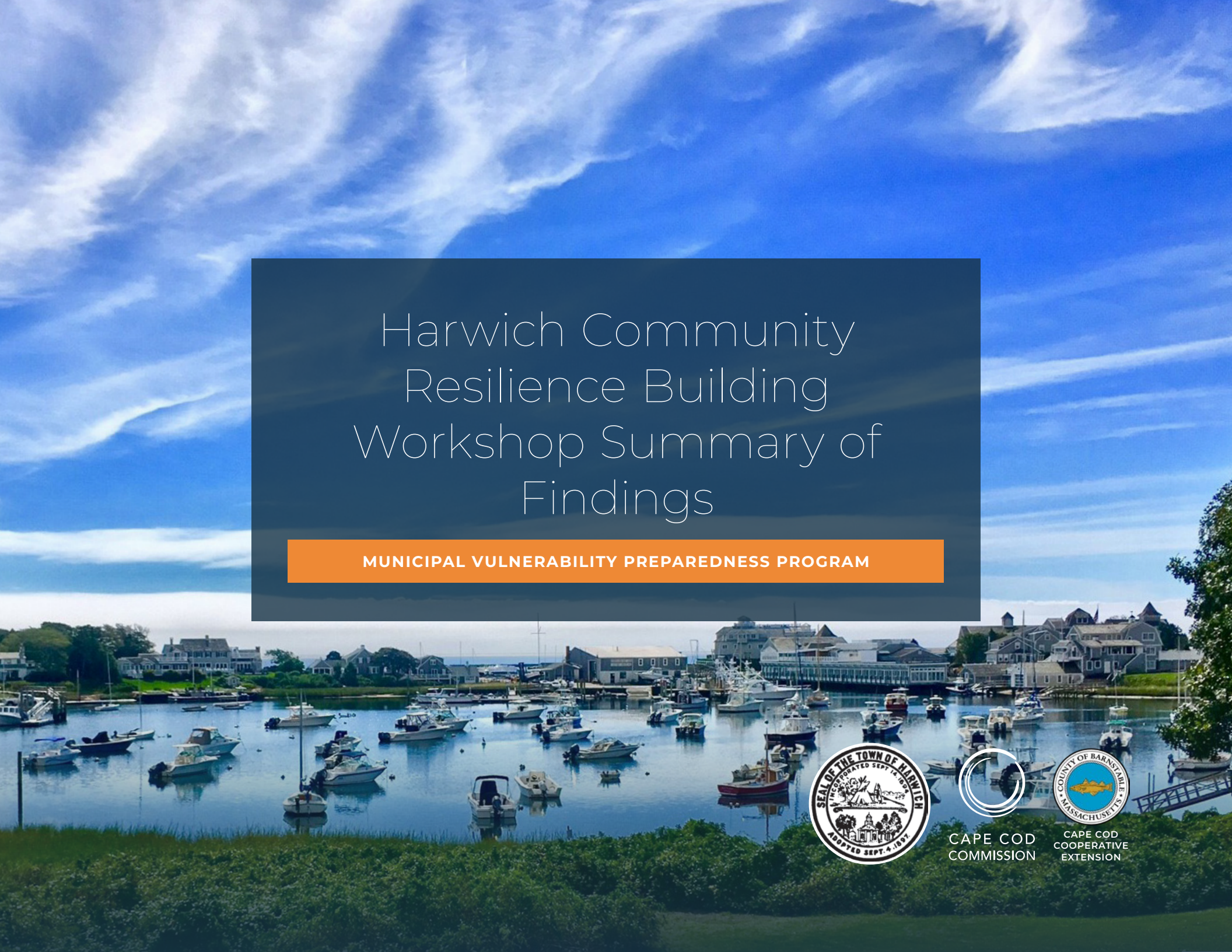

Harwich Community Resilience Building Workshop Summary of Findings

MUNICIPAL VULNERABILITY PREPAREDNESS PROGRAM

CAPE COD COMMISSION

CAPE COD COOPERATIVE EXTENSION

ACKNOWLEDGEMENTS

Thank you to the Town of Harwich for eagerly taking on this process and providing the facilities and refreshments for the workshop, and to the participants for their vital input about the town, and to Courtney Rocha, MVP Regional Coordinator for her attendance.

This project was made possible through funding by the Municipal Vulnerability Preparedness Program from the Massachusetts Executive Office of Energy and Environmental Affairs.

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Introduction and Workshop Overview

It is apparent that municipalities, regional planning organizations, states, and federal agencies need to plan for increased resilience and adaptation to extreme weather events and climate change, especially coastal communities. Changing climate conditions and associated natural hazards, including sea level rise and extreme weather events, are already impacting Cape Cod and its communities. Recent events such as the strong nor'easters of 2018 unleashed a new sense of urgency to act. Massachusetts Governor Baker's Executive Order 569 aims to provide communities with technical support, climate change data, and planning tools to identify natural hazards and develop strategies to improve resilience.

To implement this executive order, the state created the Massachusetts Municipal Vulnerability Preparedness (MVP) program, a state program designed to increase municipalities' resilience to natural hazards exacerbated by climate change. Through the MVP process, municipalities identify their vulnerabilities and strengths, as well as opportunities to reduce their risk and build resilience. Communities that complete the MVP workshop process using the Community Resilience Building (CRB) Framework —a system of facilitated discussion and prioritization developed by The Nature Conservancy—become eligible to receive funding for resilience projects.

The Town of Harwich received a $20,000 grant from the Massachusetts Executive Office of Energy and Environmental Affairs to become an MVP designated community. It sought to build upon its 2017 Multi-Hazard Mitigation Plan and other resiliency planning efforts and develop a list of priority actions to focus on in the immediate future. The Town contracted with the Cape Cod Commission, who partnered with Cape Cod Cooperative Extension/Woods Hole Sea Grant staff, as the certified MVP provider to guide the town through the MVP program process and conduct the CRB workshop.

This report provides a summary of the concerns, ideas, and priority actions shared and developed by participants at the Harwich MVP workshop compiled from workshop materials, discussions, and comments from workshop participants and core team members.

WORKSHOP PLANNING, CORE AND PROJECT TEAMS

The Town established a "core team" of town staff to help prepare for and conduct the workshop with Harwich Town Planner Charleen Greenhalgh as the lead project coordinator for the town. In addition to the Town Planner, representatives from several town departments including Administration, Council on Aging, Police, Fire, Health, Public Works, Conservation, Harbormaster, and Natural Resources, as well as others, comprised the core team. For a complete list of Harwich core team members, see listing on page 19. Cape Cod Commission staff and Cape Cod Cooperative Extension/Woods Hole Sea Grant staff comprised the "project team." See the listing on page 19 for a list of project team members.

The project team and core team held a kickoff meeting in November 2019 to review the project scope; identify ways to engage stakeholders; and begin workshop preparations. At this initial meeting, the core team started to brainstorm potential stakeholders to invite to the workshop who would represent a broad range of interests in the community including the business sector, social services, churches, and civic groups, and interested Harwich residents. The teams discussed outreach strategies including developing a town webpage and sending targeted email invitations to town boards. The core and project teams also discussed workshop background materials such as the base map, PowerPoint presentation, and they reviewed the meeting format.

Following the kick-off meeting, the project team developed drafts of workshop materials and assisted the core team with some of their outreach to stakeholders, including members of the public. Members of both teams met again in January 2020. At this meeting, the teams reviewed the draft workshop materials, identified any needed changes or edits, and went over the final workshop logistics. Part of this meeting included reviewing a draft presentation for the workshop. The presentation would help provide workshop attendees with background information on the purpose of the MVP program and planning effort, provide data, maps, resources, and other information on climate change and other hazards facing the town, and help prepare workshop attendees and guide them through the small group breakout exercises. The group discussed edits and additions to the presentation including providing some data on additional hazards, such as high wind events. The project team incorporated these changes into the final presentation.

Beginning a couple of months before the workshop, the core team began outreach to potential workshop attendees, sending

invitations to local board and committee members, homeowner association representatives, and other identified stakeholders. The town also created a webpage on the town website with information about the workshop, including a public invitation to participate and a brief survey on natural hazards and climate change for those who were interested. The website also provided a link to the Massachusetts MVP Program website and Cape Cod Commission story map, which community members could view to help inform them about the program and hazards prior to the workshop.

WORKSHOP ATTENDEES

The workshop was held at the Harwich Cultural Center on January 31, 2020 and conducted in accordance with Community Resilience Building (CRB) guidance for a single-day workshop.

In addition to the project team members, approximately 35 stakeholders participated in the workshop, including town department staff, town board and committee members, public safety officials, residents, and local business owners and employees who work in healthcare, hospitality, social services, banking, real estate, local churches and other services/businesses. For a complete list of project participants, see the list on page 18.

WORKSHOP PROCESS

The goal of the workshop was to identify existing and future infrastructural, societal, and environmental vulnerabilities resulting from natural hazards and changing climate conditions and to collect, develop, and prioritize municipal and community resiliency actions. The workshop's central objectives were to:

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

The town project coordinator, Charleen Greenhalgh, opened the workshop with a brief introduction and explained the town's interest in pursuing MVP community designation. The project team then gave a presentation providing an overview of the MVP program and the workshop goals. Next, Greg Berman, Coastal Processes Specialist with Woods Hole Sea Grant & Cape Cod Cooperative Extension, gave a presented to the group on the top vulnerabilities and hazards identified by the State, regional vulnerabilities and hazards, and climate change projections for Massachusetts and the region using data from the Climate Change Clearing House for the Commonwealth (www.resilientma.org) (see Appendix for the presentation). This portion of the workshop allowed participants to learn about and discuss locally relevant climate hazards including:

- Coastal erosion
- Flooding
- Hurricanes
- Nor'easters
- Sea level rise
- Severe winter weather
- Drought
- Fire (Wild)
- High winds (including tornadoes)

Mr. Berman presented how most of the shoreline of Harwich is along Nantucket Sound, which is vulnerable to the high storm surge potential of tropical cyclones (including hurricanes). This leads to needing over four feet of sea level rise to change the return period of a 100-year storm (aka 1% chance in a given year) to a 10-year storm (aka 10% chance in a given year). Other areas on Cape Cod only need about one foot for this type of change in return period. Despite the relatively high degree of sea level rise needed to affect the return period, even 1-4 feet of sea level rise will flood roads daily in some low-lying areas. He also showed visualizations of flooding at 1-4-foot intervals of sea level rise for Red River Beach and the Saquatucket Harbor area. The significant increase in development (and the risk to that development) of the Saquatucket Harbor area from the 1950s to now was illustrated with historic aerial photographs. The group discussed all tornado activity since the 1950s (three on Cape Cod and the Islands) to put the tornado activity of July 2019 in context. Additionally, Mr. Berman explained the differences and similarities between tornadoes, hurricanes, and nor'easters. The 2019 tornado had wind speeds up to the strongest nor'easters and even up to a category 2 hurricane, but for a much shorter time. The group also discussed the potential impacts to groundwater due to sea level rise and the effect of climate change on projected rainfall patterns and wildfires.

Workshop participants sat at one of four discussion-group tables (A, B, C, and D) for the duration of the workshop. Each table had a facilitator and a scribe from the project team. Base maps with town information such as critical facilities, infrastructure, floodplains, and sea level rise were placed at each table (see Appendix for base maps). Each table also had a laptop with access to the online story map and Climate Change Clearinghouse available for the participants to use. An easel with a blank "risk matrix" was placed at each table for the group to fill out. Each table worked on its own risk matrix through facilitated small team exercises and later worked together as a large team with all participants to consolidate information (see the appendix for completed risk matrices). The combination of the risk matrix and base maps provided information and visualizations that allowed stakeholders to identify the community's strengths and vulnerabilities and prioritize actions to reinforce strengths or mitigate vulnerabilities. The process resulted in informed input, shared experiences, and dialogue among stakeholders.

TOP HAZARDS

Using the base maps and story map as resources, facilitators guided each small team through a discussion to identify what each small team considered to be the four hazards that pose the greatest current and future threats to Harwich. A slide showing the hazards from the state hazard plan was projected on the screen for reference. The facilitators asked participants to consider several things to help them determine their top four priority hazards such as what hazards are impacting the community currently and what effects these hazards will have in the future.

STRENGTHS AND VULNERABILITIES

Following the hazards discussion, the groups identified infrastructural, societal, and environmental features that present either a vulnerability or a strength to the community in the face of existing and anticipated natural and climate change hazards. Participants marked these features on the base maps and the scribe listed them on the risk matrix. In addition to the features, participants were asked to indicate each feature's location, ownership, and whether it is a strength or vulnerability (or both) for the town. The exercise concluded with each group reporting out its priority hazards, the features they identified, and whether they are strengths and/or vulnerabilities.

ACTIONS

After a lunch provided by the town, workshop attendees continued their work on the second small-group exercise: to develop a list of actions to address or mitigate the vulnerabilities and support or enhance the strengths. In addition to developing the actions, the groups were tasked with identifying a timeframe for their implementation (short, long, ongoing) and priority (high, medium, low). The final task for the small group exercise was to choose their three to five highest priority actions, write each priority action on a sheet of paper, and report out to the large group. As groups reported their top priority actions to the large group, a project team member collected them and laid them out for the larger group to view. Following each table's reporting on its priorities, the large group combined duplicative suggestions to create a final list of actions from which to choose the top priority actions. Participants then voted on their top five actions using colored dots. The project team tallied up the dots for each action and confirmed with the larger group that they felt the actions with the most dots were the top priority actions for the town to increase the community resilience in the face of anticipated natural hazard and climate change impacts.

WORKSHOP RESULTS – STAKEHOLDER INPUT

The results of each stage of the workshop discussions are presented in the subsequent sections of this report. In addition, the risk matrices produced by each of the four discussion groups, and the base maps with notations from each table can be found in the appendix. All of the identified actions from the four discussion groups are compiled in the final risk matrix. A list of the workshop participants can be found on page 18.

Top Hazards, Vulnerabilities and Strengths

TOP HAZARDS OF CONCERN

The small groups discussed whether top priority hazards should be identified as those with the most impact, such as a hurricane; those that occur more frequently such as flooding or high winds; or hazards that the town was least prepared for, would impact the town's budget, and/or impact the most people. Participants also noted there was overlap among the top hazards, such as high winds and hurricanes, or nor'easters and winter weather.

The following list represents all the priority hazards reported by the four discussion groups:

- Severe storms
- Sea level rise
- Flooding
- Extreme Heat
- High Winds
- Erosion (and sediment deposition)
- Severe weather

CURRENT CONCERNS AND CHALLENGES

Addressing natural hazards and climate change impacts is critical to the Town of Harwich as a coastal community on Cape Cod that has experienced impacts from recent powerful storms and rising sea levels. Harwich's roads and harbors, older residents, and beach areas are all vulnerable. Like other communities on the Lower Cape, Harwich's economy is largely dependent on healthy coastlines. However, the town has limited resources to protect its assets from hazards and climate change impacts and needs to identify priority actions in its protection/ mitigation strategy.

Workshop participants identified sea level rise, flooding, severe storms/weather, erosion, extreme temperatures, and winds as principal concerns presented by natural hazards and climate change. Storms have impacted Harwich for decades, but in recent years storm frequency and intensity have increased. Flooding due to rising sea levels and more intense storms put Harwich's 11 miles of tidal shoreline along Nantucket Sound containing four harbors, and less than two miles along Pleasant Bay, at risk.

With thousands of Harwich homes and properties in areas at risk from flooding and sea level rise, the town's future tax base could be impacted. Vulnerable coastal properties—some of the most expensive in town—are threatened by flooding and coastal storms. Sea level rise and coastal storms also threaten the town's beaches, marshes, and other natural and recreational assets that Harwich's tourism-based economy depends upon. The infrastructure that supports coastal assets, including roadways, harbors, and parking lots along the coast, is vulnerable as well. Looking forward, participants also recognized that sea level rise will likely exacerbate flooding and other impacts in areas throughout town.

Storms and severe weather such as nor'easters, hurricanes, and other high wind events (e.g., the July 2019 tornado) were also identified as major concerns for the community. The more frequent nor'easters do not cause as much flooding in most of Harwich though in the Pleasant Bay area there is flooding. Throughout Harwich, these events still cause significant damage and disruption with power outages and downed trees and limbs, which can impede access to residents and businesses; cause property damage; and place a strain on public safety resources and personnel. The majority of Harwich's shoreline lies along Nantucket Sound, which is vulnerable to tropical storms. While they occur with relatively low frequency, a tropical storm has the potential to be extremely destructive with high winds and flooding of large swaths of coastline in addition to power disruptions and inland road closures.

In addition to more severe flooding and storms, workshop participants expressed concern that the changing future climate will likely bring heat waves and droughts, which could increase the risks of power outages and wildfires, threatening residents and visitors, the infrastructure they rely on, and the town's economy and natural landscapes and resources.

Coastal erosion has impacted beaches, the parking lots that serve these beaches, and numerous private properties. Maintaining access to local beaches and harbors is important for the community, particularly with its seasonal and tourist-driven economy, but some of the potential strategies for protecting these assets (e.g., sea walls and jetties) might also present natural resource and funding challenges.

SPECIFIC CONCERNS AND VULNERABILITIES

Primary features identified during the workshop group discussions as vulnerable to natural hazards and climate change include:

LOW-LYING INFRASTRUCTURE

Workshop participants identified flooding and sea level rise as significant concerns that the town is facing both currently and in the recent past, and will continue to face in the future, particularly flooding on regional and local roadways. Several low-lying roads, bridges, and culverts in Harwich already flood during storm events. Many key roads in town are low-lying, including portions of Route 28, Red River Beach and Saquatucket Harbor areas, Lower County Road, Shore Road, North Road, Bell's Neck, Lothrop Avenue, and Bay Road, and associated culverts and stormwater systems as being particularly vulnerable. The groups also noted that stormwater systems associated with these roads may be inadequate to handle more frequent and intense storms in the future. Beaches, coastal parking lots, and infrastructure for recreation, aquaculture, and fishing, may be affected by sea level rise, flooding from storms, and/or coastal erosion.

Additionally, the groups noted a regional health care center, several harbors (Saquatucket, Wychmere and Allen), jetties and groins, and other infrastructure such as septic systems and key bridges in town (Bass River, Lower County, and Allen Harbor bridges) as vulnerable to storm-related and sea level rise flooding and located within the floodplain. As little as two feet of sea level rise could negatively impact several critical harbor facilities and sections of this shoreline.

EMERGENCY SHELTER AND ACCESS

Workshop participants identified uncertainty regarding the town's future use of Cape Cod Regional Technical High School as a regional emergency shelter. Many participants did not know that the new school replacement will no longer serve as the regional shelter, and those that did know expressed dismay about losing that resource. Several people also indicated that they weren't sure where the current emergency shelter is. In addition to questions about where Harwich's shelter is and will be, access/transportation to the shelter and evacuation routes were also identified as a concern. Outreach, education, and communications with different groups of people—including J-1 international students/workers, the elderly population, and seasonal residents—regarding emergency preparedness and response was noted as needing enhancement (see Vulnerable Populations section below.)

SEASONALITY AND TOURISM

The increase in summer visitors and residents increases the level of need for emergency response, public education, and population management during storm events. Additionally, many of the features that attract the summer population are vulnerable to the identified hazards, posing a challenge between supporting natural resources and hazard management, and the economic value of summer populations,

beaches, and seasonal housing in vulnerable locations. In addition, the seasonality of the population creates challenges for public officials in their efforts to educate and inform the community about hazard and climate change impacts and resiliency planning. With a significant portion of the population away for several months of the year, it is challenging to ensure that the community is well informed about the town's hazard planning and climate change challenges.

COASTAL INFRASTRUCTURE

Beaches, coastal parking lots, and harbor/maritime infrastructure for recreation, aquaculture, and fishing may be affected by sea level rise, flooding from storms, and/or coastal erosion.

VULNERABLE POPULATIONS

Harwich has a significant senior population, which may have additional needs during hazard events. Assisted living and nursing home facilities including Rosewood Manor, Wingate, and Pine Oaks Village were identified as locations where many residents are older and may need assistance during flooding, storms, or extreme temperature events as they may have mobility challenges or be in need of medical supplies. Harwich's seasonal workers—many of whom are international J-1 visa students—are also a vulnerable population that may need additional education and communication during hazard events. Most of the seasonal workers are unfamiliar with the town's emergency planning, are likely to be unaware of what to do during a hazard event, and may face language and financial resource barriers. Workshop participants noted that during the July 2019 tornado, employers were concerned about the welfare and safety of the workers. Additional communication and outreach efforts are needed to address the more vulnerable populations.

TELECOMMUNICATIONS/ UTILITIES

Most of Harwich is served by above ground utilities for power, internet, and phone service, which can become incapacitated during and following storm and high wind events. Without power, residents may lose access to heat and water, and food may spoil. When the telecommunications systems are down, people lose the ability to contact others for help, and their isolation may compromise their safety, especially in an emergency. The vulnerability of both the power supply and delivery infrastructure, as well as telecommunications, has been shown during recent storm events.

NATURAL SYSTEMS AND OPEN SPACES

Participants noted Red River beach is a barrier beach that provides protection to inland properties and is vulnerable to erosion. While salt marshes may provide flood protection by allowing for flood water storage, they are also vulnerable to sea level rise if there is no space for landward migration. Land acquisition to allow for marsh migration may be needed. Sediment supply and management on recreational beaches and generally within the coastal resource system is a concern; navigation channels may be filling in with sediment

that would naturally bypass if it weren't for a jettied inlet. Concurrently, this sediment is not making it past the jetty or groin to provide sediment for downdrift beaches and dunes which are eroding more quickly than in a natural system.

Septic systems and stormwater systems could also impact the natural systems. These systems may be vulnerable to flooding from either fresh or salt water, and could fail and their failure could impact the water quality of both salt and fresh water bodies, including ponds and drinking water. Undersized culverts and sea level rise could exacerbate the flooding impacts to the natural environment. Tree damage during storms and high wind events and subsequent disposal of debris has been problematic.

CURRENT STRENGTHS AND ASSETS

The small groups identified numerous strengths and assets within the community for improving local and regional resilience to climate change and hazard impacts. Several community features were identified as both strengths and vulnerabilities.

The following is a list of examples of assets participants identified:

INFRASTRUCTURE

- Saquatucket and Allen Harbors/Marinas
- Red River beach tide gate
- Coastal engineering structures such as jetties and groins
- Public water system
- Wellfields
- Roads

SOCIETAL

- Communications: Channel 18/ Local Access TV, reverse 911, neighborhood groups/associations
- Town staff: Department of Public Works, Emergency Management/ Safety, Town Nurse, Town Hall,
- Schools and shelters
- Council on Aging and Harwich Community Center
- Health Centers: Fontaine Medical Center, Outer Cape Health Services
- Conservation Trust

ENVIRONMENTAL

- Muddy Creek (replacement of undersized culvert with bridge)
- Red River Beach
- Conservation Trust
- Conservation Bylaw
- Flood regulations
- Marsh migration
- Ponds
- Trees

Saquatucket harbor/marina was recently improved and is an asset for the community. Other harbors were noted as assets or strengths, but also as vulnerabilities as they may be vulnerable to flooding and storms. Having medical services such as Outer Cape Health Services and Fontaine in the community is an asset as well, though participants noted the need for

a vulnerability assessment for access to Fontaine, and Outer Cape Health Services is located in a FEMA Flood Zone.

Harwich's emergency medical services, emergency management team, and department of public works were identified as strengths of the community. The Town operates an emergency notification system that enables town officials to send out notifications of emergencies to all users who have signed up for the service. This is an effective means of communication but is limited by the fact that only those who have signed up will get the notifications.

The natural environment, including town beaches, harbors, ponds, and conservation areas are a significant draw to residents and visitors in Harwich and all provide buffering from storm events. Participants noted that the town's marshes are community strengths, as they help absorb floodwaters and potentially sea level rise. Fishing and shellfishing and the maritime culture in general, as well as water-based recreation and tourism, are also community assets, though it was noted that these are potentially vulnerable to impacts from climate change and severe storms. The Conservation Commission, Conservation Trust, and their open space protections were also noted as strengths in addition to a strong conservation by-law.

Actions, Recommendations, and Next Steps

The afternoon portion of the workshop focused on participants working in their small groups to develop actions to help mitigate Harwich's vulnerabilities and capitalize on its strengths and make Harwich more resilient to the top hazards identified during the morning portion of the workshop. Working in the same small groups as the morning, participants:

1. Generated potential actions to reduce vulnerabilities and reinforce the strengths identified during the morning session
2. Considered whether the identified actions address more than one top hazard, are intermediate steps, or strengthen existing initiatives
3. Prioritized actions and differentiated them as short-term, long-term, and ongoing; and
4. Identified their top five actions to improve resilience to the top hazards in Harwich.

The top recommendations reported out of the four small groups included the following in no particular order (notes in parentheses indicate actions the larger group decided to combine prior to voting):

1. Development in the floodplain: Climate ready zoning and design guidelines (designing for the future in the floodplain)
2. Identify areas for marsh migration for land acquisition (combined with #3)
3. Evaluate salt marsh migration options (combined with #2)
4. Assessment and alternative analysis to address Lothrop Avenue utilities including an above ground water main, electric substation, and underground cable for protection from high ground water caused by flooding and wind damage

5. Realign and/or raise jetties on south shore to accommodate increased storm activity and sea level rise to protect beaches and barrier beaches that reduce inland flooding
6. Municipal roads and culverts: Vulnerability assessment of roads and culverts and implementation of priorities from assessment (combined with #7 and #8)
7. Develop town-wide stormwater model including evaluation of low-lying roads (assessment) and evaluation of culverts and conveyances (combined with #6 and #8)
8. Roads and drainage assessments of low-lying roads (combined with #7 and #8)
9. Vulnerability study of water department well fields
10. Develop shelter plan including identifying shelter location (s) and shelter in place (combined with #11)
11. Town building assessment for new emergency shelter (combined with #10)
12. Develop civic participation or education plan for preparation and planning (combined with #13)
13. Develop outreach and education program on vulnerability and preparedness through public/private partnerships (combined with #12)
14. Develop sediment management plan for beaches
15. Communication strategy including: businesses (healthcare, electricity, internet, food), residents, seasonal population, workforce, power access, town emergency operations, transportation, debris removal, tree management, shelters, and pets, reverse 911
16. Develop utilities plan including tree trimming and undergrounding
17. Develop regulations for land subject to coastal storm flowage (LSCSF)
18. Prioritize non-cellular communications for town staff to strengthen communications during emergencies
19. Accelerate sewer construction to benefit freshwater pond health (combined with #20)
20. Continue sewer expansion (combined with #19)

Each small group presented their top priority actions to the large group. The large group combined similar actions and then voted through a dot exercise to identify the top five actions for Harwich to implement to improve its resiliency to climate change and the identified top hazards. Each workshop participant was given five dot stickers. They could then put their five dots on the actions they felt should be the top priorities for the town. Participants could decide to put one dot each on five actions, all five dots on a single action, or some combination in between. After all workshop participants had placed their dots on their top priority actions, the project team tallied up the dots for each action and confirmed with the larger group

that they felt the actions with the most dots were the top priority actions for the town. Following are the top five recommended priority actions as determined by the larger group through the dot exercise, listed in order of priority.

1. MUNICIPAL ROADS AND CULVERTS

All groups identified low-lying roads, culverts, and stormwater infrastructure as vulnerable and/or inadequate. Roadways are key to evacuating people, providing access for emergency responders, as well as for everyday travel and services. With several key roadways in Harwich vulnerable to flooding and sea level rise already and in the future, the group identified an assessment of the vulnerable roadways as a top priority. Given the potential increase in frequency and intensity of precipitation events in the future, the large group agreed it was important to assess Harwich's roads, culverts, and stormwater infrastructure and identify and prioritize needs to improve their function and resiliency.

2. SHELTER PLAN

The groups identified current emergency response times, shelters, and communications as strengths and assets that can be reinforced or enhanced. An evaluation of shelters and emergency communications could identify areas for improvement in these systems to ensure more people are prepared for and notified about severe weather events, reducing the number of people who may be isolated during such events. With the recent construction of the new Cape Cod Regional Technical High School, it may no longer be available as a regional shelter; therefore, the group highlighted the need to identify the main shelters in town.

3. COMMUNICATION STRATEGY

The groups identified communications as a strength that can be enhanced with a communication strategy that includes businesses (such as healthcare, utilities, food), residents, and seasonal visitors and workers. A communications strategy could include information regarding town emergency operations, access to power and shelters, transportation to shelters and identification of shelters that allow pets, tree management, and debris removal. It could also build off of the newly acquired CivicReady Alert System, which can text, call, or email the 9,000 citizens and business owners in its system. Participants identified the need for non-cellular communications for town staff to strengthen communications during emergencies.

4. SEWER EXPANSION

Harwich is in the process of installing sewer service to sections of town to connect to the wastewater treatment plant in Chatham. The group noted that water quality in ponds and embayments would benefit sooner with an accelerated sewer construction timeline.

5. JETTIES

Harwich has numerous jetties on its south shore. The participants identified a need to evaluate ways for the jetties, groins, or other techniques such as sediment management,

to accommodate increased storm activity and sea level rise to protect beaches and barrier beaches that reduce inland flooding.

CONCLUSION AND NEXT STEPS

The Town of Harwich continued the MVP certification process by creating a video on the process and gathering feedback during a listening session comment period in May and June of 2020. During this period, any member of the interested public could watch a video and read the draft report to learn about the MVP process and then provide feedback via email or a survey about the MVP workshop and resulting recommended highest priority actions. Only a few people provided feedback during the listening session comment period through the online survey. Generally survey responses aligned with the outcomes of the workshop in terms of top hazards and top priority actions, though a shelter plan and communications plan were not as highly ranked by the survey respondents. Due to the small number of survey responses, however, the feedback from the listening session did not result in changes to the top priority actions developed during the workshop. Full survey responses are available in the appendix; the video can be viewed at https://cccom.link/HarwichMVP.

Moving forward, local planning efforts will incorporate the priorities identified during the workshop. To implement the priority actions to improve the Town's resilience to climate change, the Town will consider pursuing grant funding as appropriate.

CRB WORKSHOP PARTICIPANTS

- Dave Aldrich
- Melanie Bach
- Dave Callaghan
- Howard Case
- Ray Chesley
- Alton Chun
- Bob Ebersole
- Barbara-Anne Foley
- John Foley
- Eric Gallagher
- Deborah Gavron
- Charleen Greenhalgh
- Adam Hutton
- Angelo LaMantia
- Dave LeBlanc
- Bob LeBlanc
- Dan Lowery
- Chris Maynard
- Christine Menard
- Emily Mitchell
- Chris Nickerson
- Marietta Nilson
- Robbie Our
- Dan Pelletier
- Joe Powers
- Heinz Proft
- John Rendon
- Jim Robichaud
- Abby Rose

- Griffin Ryder
- Jack Sheeran
- Katie Tenaglia
- Carol Thayer
- Rick Travers
- Amy Usowski
- Cyndi Williams
- Courtney Rocha (MVP Regional Coordinator)

CRB CORE TEAM

- Charleen Greenhalgh, Town Planner, Planning Department, Project manager for the town
- Katie Tenaglia, Senior Health Agent, Health Department
- Amy Usowski, Conservation Agent, Conservation Department
- Joe Powers, Interim Town Administrator, Town Administration
- Ray Chesley, Building Commissioner, Building Department
- Heinz Proft, Natural Resources Director, Natural Resources
- Chris Nickerson, Maintenance Manage, Public Works Department
- Griffin Ryder, Town Engineer, Engineering Department
- John Rendon, Harbormaster, Harbormaster Department
- Dan Pelletier, Water Superintendent, Water Department
- Adam Hutton, Lieutenant, Police
- Kevin Considine, Deputy Chief, Police
- Bruce Young, Fire Inspector, Fire
- Dave LeBlanc, Deputy Fire Chief, Fire
- Emily Mitchell, Council on Aging Director, Council on Aging
- Jamie Goodwin, Station Manager, Channel 18
- Cyndi Williams, Executive Director, Harwich Chamber of Commerce

CRB PROJECT TEAM (MVP PROVIDER)

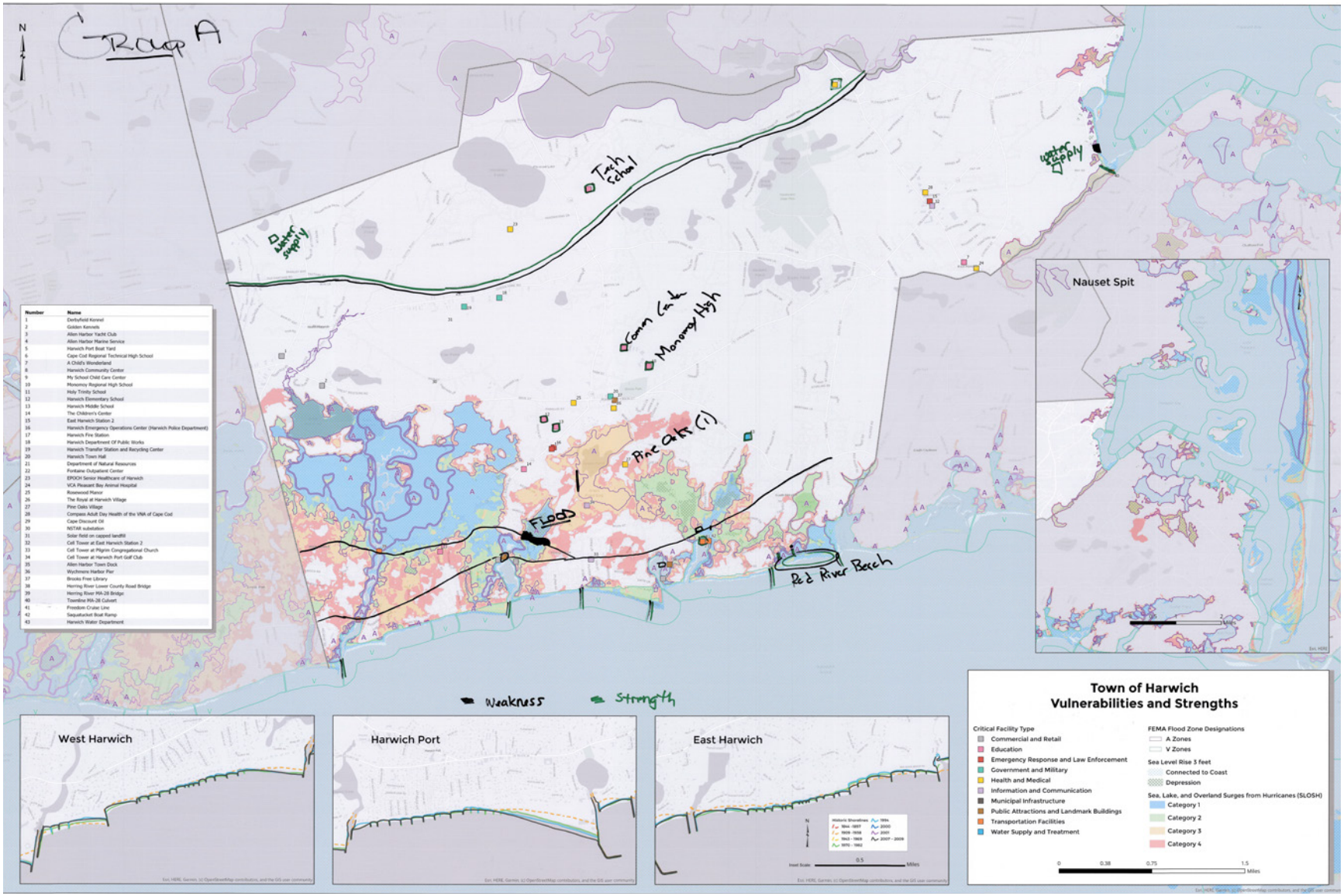
CAPE COD COMMISSION

- Danielle Donahue, Special Projects Coordinator
- Martha Hevenor, Planner II
- Heather McElroy, Natural Resources Manager
- Erin Perry, Deputy Director
- Jessica Rempel, Natural Resources Analyst
- Anne Reynolds, GIS Director
- Chloe Schaefer, Chief Planner
- David Still, Digital Communications Specialist
- Michele White, Special Projects Coordinator

WOODS HOLE SEA GRANT/CAPE COD COOPERATIVE EXTENSION

- Greg Berman, Coastal Processes Specialist
- Shannon Hulst, Deputy Director, Cape Cod Cooperative Extension and Floodplain Specialist & CRS Coordinator

Appendix



GROUP A BASEMAP

Community Resilience Building Risk Matrix www.CommunityResilienceBuilding.org

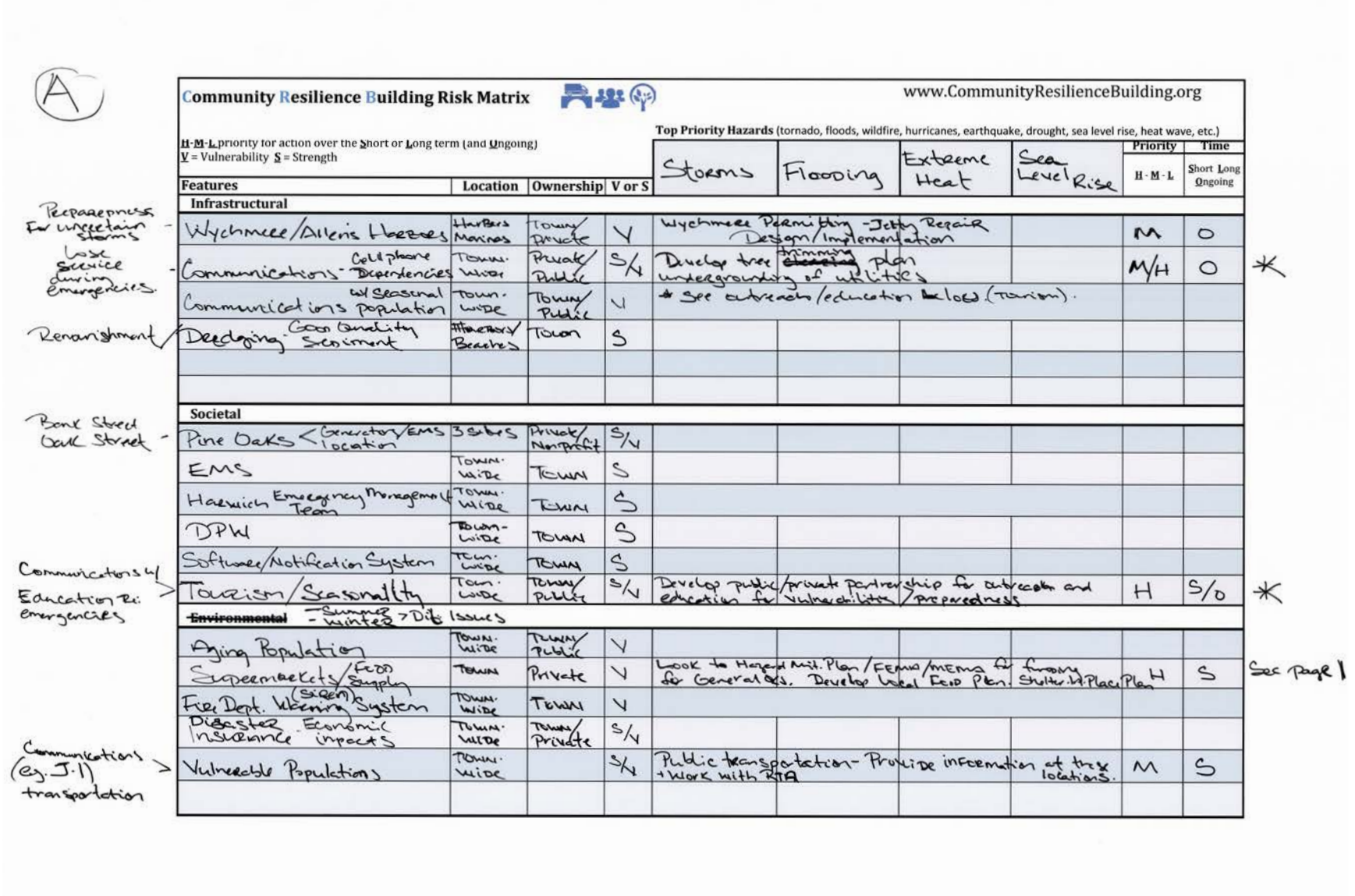
H-M-L priority for action over the Short or Long term (and Ongoing)
V = Vulnerability S = Strength

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

Features	Location	Ownership	V or S	Storms	Flooding	Extreme Heat	Sea Level Rise	Priority H-M-L	Time Short Long Ongoing
Infrastructural									
Roads: Rte 28 (W section) Rte 6	Rte 28 Rte 6	MASSDOT	V S/V	- Assessment of Rte. 28 + work w/ State.				M	S
Bass River Bridge			V						
Red River Beach Tide Gate	Red River Beach	TOWN	S						
Water Supply	Town-Wide	TOWN	S						
Jetties		TOWN	S/V						
Saquatucket Harbor/Marina		MA/TOWN	S						
Societal									
Schools				* In General, develop prioritization plan for all critical facilities - ID which to Relocate.				H	S
Shelters ~~Staffing Emergency Facilities~~	Town-Wide	TOWN	V	Develop Shelter Plan - inc. Shelter-in-Place Identify Shelter Location.				H	S *
Channel 18/Communications	Town-Wide	TOWN	S	Strengthen communications between Town Depts/Staff				H	S *
COA/Community Center	Oak Street	TOWN	S	self-reported list - outreach to expand list				M	L
Fontaine/Outer Cape	Rte 6 exit 11 Rte 28 & Hi-Port	Private	S/V						
Transit to Shelters	Town-Wide	TOWN/Regional/Public	V	Staffing/Drivers limited. (See Shelter Plan)					
Environmental									
Muddy Creek Culvert Replacement w/ BRIDGE	Muddy Creek	TOWN	S						
Red River Beach < Protection EROSION	Red River	TOWN	S/V						
Strong Conservation Trust	Town-Wide	Private	S						
Flood Regulations	Town-Wide	TOWN	S	MASSDEP - Regs for LSCSF - Develop @ the town level. (No Standards)				H	S *
Conservation By-law	Town-Wide	TOWN	S						
Undersized Culverts	Town-Wide	TOWN	V	Evaluation + prioritize Road/Culvert/Stormwater Repair/replacement				M	O
Open Space/Conservation Lands	Town-Wide	TOWN/Private	S						
Stormwater Systems	Town-Wide	TOWN	S/V						
Septic Systems	Town-Wide	Public	V	Investigate opportunities to tie wastewater funding to MVP funding.				M	O

Capacity
CapTech

GROUP A RISK MATRIX 1



A

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.)

Features	Location	Ownership	V or S	Storms	Flooding	Extreme Heat	Sea Level Rise	Priority H-M-L	Time Short Long Ongoing
Infrastructural									
Wychmere/Allens Harbors	Harbors Marinas	Town/Private	V	Wychmere Permitting - Jetty Repair Design/Implementation				M	O
Communications - Cell phone Dependencies	Town-Wide	Private/Public	S/V	Develop tree ~~trimming~~ plan undergrounding of utilities				M/H	O
Communications w/ Seasonal population	Town-Wide	Town/Public	V	* See outreach/education below (Tourism).					
Dredging - Good Quality Sediment	Harbors/Beaches	Town	S						
Societal									
Pine Oaks < Generator/EMS location	3 sites	Private/Nonprofit	S/V						
EMS	Town-Wide	Town	S						
Harwich Emergency Management Team	Town-Wide	Town	S						
DPW	Town-Wide	Town	S						
Software/Notification System	Town-Wide	Town	S						
Tourism/Seasonality	Town-Wide	Town/Public	S/V	Develop public/private partnership for outreach and education for vulnerabilities/preparedness				H	S/O
~~Environmental~~ - Summer - winter > Dis Issues									
Aging Population	Town-Wide	Town/Public	V						
Supermarkets/Food Supply	Town	Private	V	Look to Hazard Mit. Plan/FEMA/MEMA for funding for Generators. Develop local Food Plan: Shelter-in-Place Plan				H	S
Fire Dept. Warning (Siren) System	Town-Wide	Town	V						
Disaster Insurance - Economic impacts	Town-Wide	Town/Private	S/V						
Vulnerable Populations	Town-Wide		S/V	Public transportation - Provide information at these locations + Work with RTA				M	S

Preparedness for uncertain storms

Lose service during emergencies

Renourishment

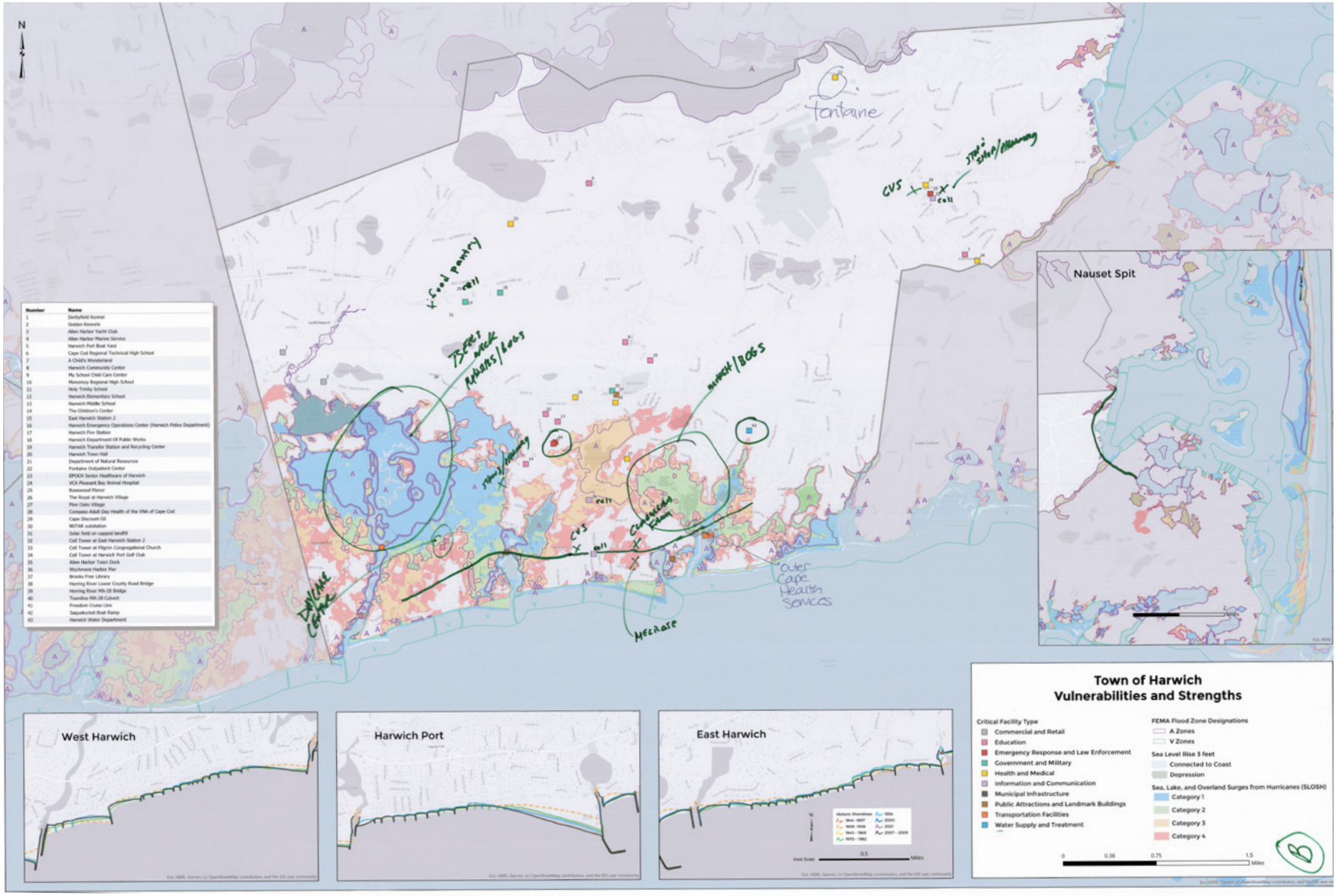
Bank Street Cahoon Hollow

Communications w/ Education re: emergencies

Communications (e.g. J-1) transportation

See Page 1

GROUP A RISK MATRIX 2



GROUP B BASEMAP

B

Community Resilience Building Risk Matrix www.CommunityResilienceBuilding.org

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V = Vulnerability S = Strength

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

Features	Location	Ownership	V or S	SLR ~~Erosion~~ Flooding	Severe Storms	Erosion / Sediment mvmt.	Wind	Priority H-M-L	Time Short Long Ongoing
Infrastructural									
low lying roads (Rt 28 near Muddy cr. Rt. 28)	Red River Area L. County Rd. Sag. Harbor	State/ local	V	roads assessment drainage "				H	O
Water Dept. well field	Chatham Rd.	local	V	site study – vulnerability & siting				H	S
fire station | police	Various	local	S						
substation	Lawthrope (2) Is. Pond Gen. Rd.	Eversource private	V				maintenance/comm. surrounding siren assessment/ disaster plan	H	S
schools | Health Ctr. | Marina	Various	local / private	V S	Outer cape vulnerab. assess. connect to Fontaine + comm. outreach	school ass. of vulnerability shelter suitability study	marina-rebuild	bulkhead (SLR)	M	S
Cell towers (multiple)	Congreg. ch. water tower flag pole	private	V					H	S
Societal									
Internet access	town wide	private	V				vulnerability assessment community outreach	H	O
Seasonal pop. | International workforce		—	V	education | outreach / Communication plan • compile list of renters → outreach social media • ID population to reach • work w/ employers • use Chamber to help				H	S
neighborhood groups		—	S	figure out how to send alerts to people not signed up town communication w/ notifications to HOAs					
reverse 911 | emergency alerts		—	S	education and outreach to sign up | communication strategy					
school systems (operations)		—	V	operation assessement for emergencies				M	O
emergency shelter (lack of)	former tech. sch.	public	V	town building assessment for potential new shelter			• funding to build shelter	H	S
Environmental									
shoreline public beaches, marinas	whole	public/ private	V						
storm debris	townwide		V	education on preventative maintenance / town plan for disposal - establish		debris disposal		H	S
water quality (septic, debris) boat fuel | gas stations			V	assessment of all marinas vulnerability • evaluate town response capacity education | outreach • update / new response equipment – evaluate need				H	O
marshes | bogs	Bells Neck area multiple		V S	continue Sewer expansion • review local Title V regs assess drainage systems in bogs | bridges / culverts				M	O
fire during storm	townwide		V	maintain fire supression system regional coordination plan				H	O
tree (damage)			V S	pruning education and outreach tree planting guidelines				H	S

GROUP B RISK MATRIX 1

B

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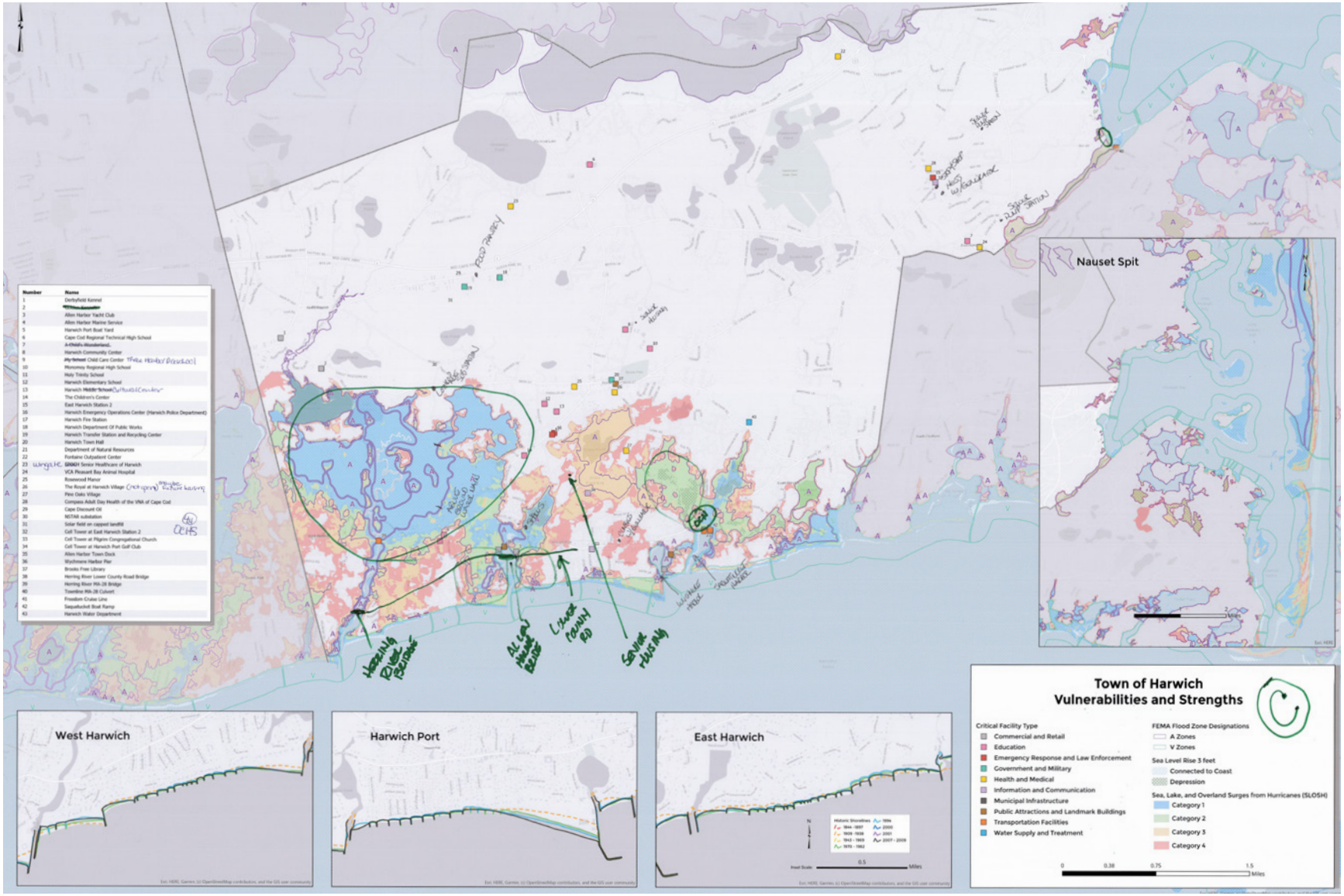
H-M-L priority for action over the Short or Long term (and Ongoing)
V = Vulnerability S = Strength

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

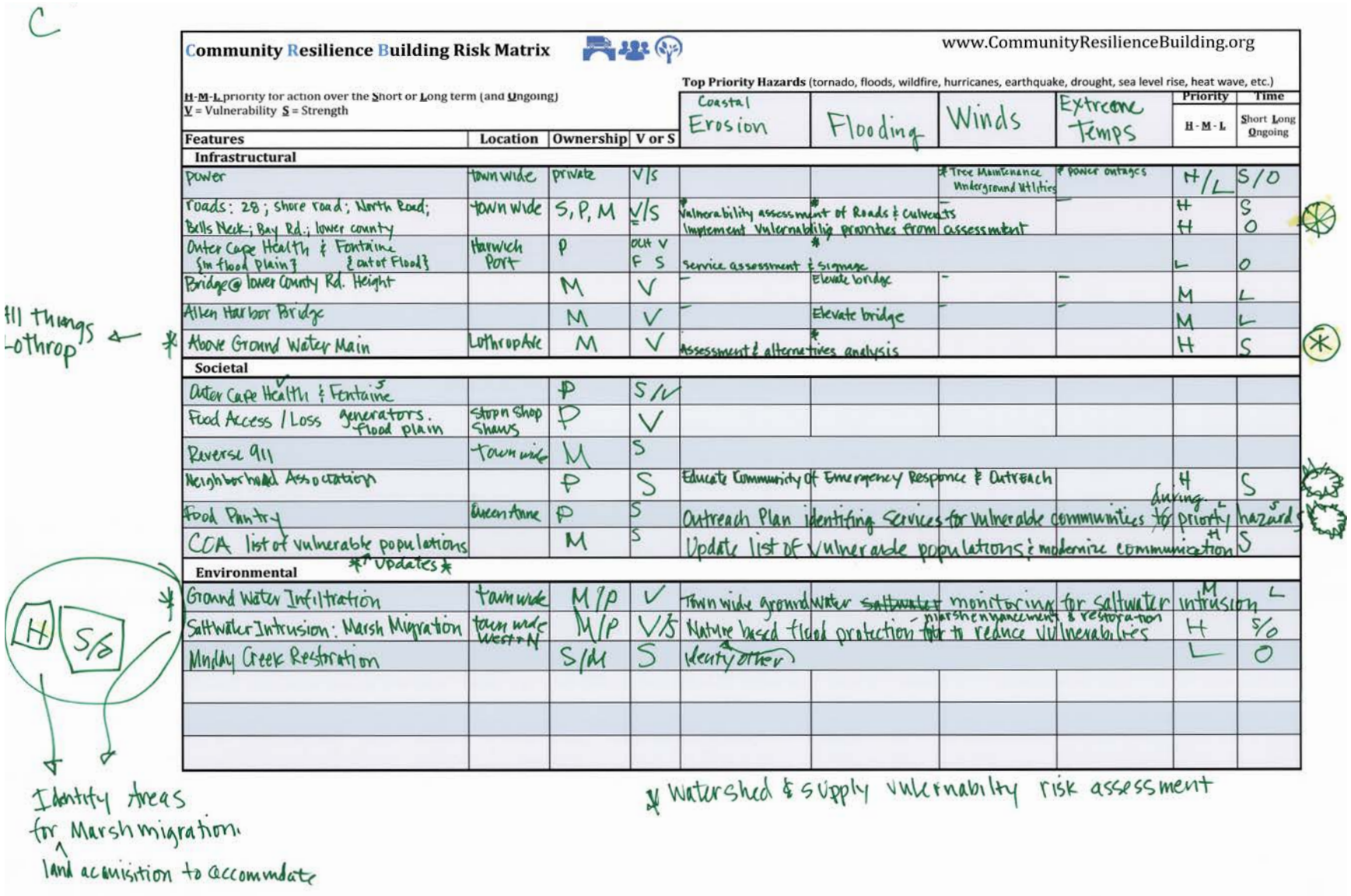
Features	Location	Ownership	V or S	SLR | Flooding	Severe Storms	Erosion | Sediment mvmt.	Wind	Priority H-M-L	Time Short Long Ongoing
Infrastructural									
grocery | gas stations | pharmacy	Stop N Shop Shaw's | star? CVS, OCHS	private	S V S	coordinate w| businesses on emergency planning education & outreach on emergency available locations				H	S
water system | sewer | septic	townwide	local/ private	V						
shelters w| pets | mobility			V	communication on availability| options				H	S
day care centers			V	See schools : operations					
community ctr. | charging stations food pantry | power, money access!		S	V	education | outreach | communications				H	S
Jetties | groins				maintain & upgrade publicly owned jetties				M	O
Societal									
access to Health care	Fontaine Outer Cape	private	V S	work w| Fontaine on emergency plan				H	S
(evacuations) access to transportation (Rt6, Rt 28)		State/ local	V	coordination w| RTA, Peter Pan, School buses pre-event				H	O
~~boat access rescue~~	~~coast~~	~~private/ public~~	~~S~~						
water front businesses	restaurants various	private	V	communication | education on protection | technical assistance compile list of vulnerable resources				H	S
looting | scammers	townwide		V	establish expedited permitting for emergency repair education | outreach				H	S
impact on tourism	⊥		S # V	post disaster communication – regional | County | Chamber				H	S
Environmental									
wild life	townwide		V						
dredging	⊥		V	evaluate opportunities to revise | update regulations				M	O

Soc

GROUP B RISK MATRIX 2



GROUP C BASEMAP



C

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

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

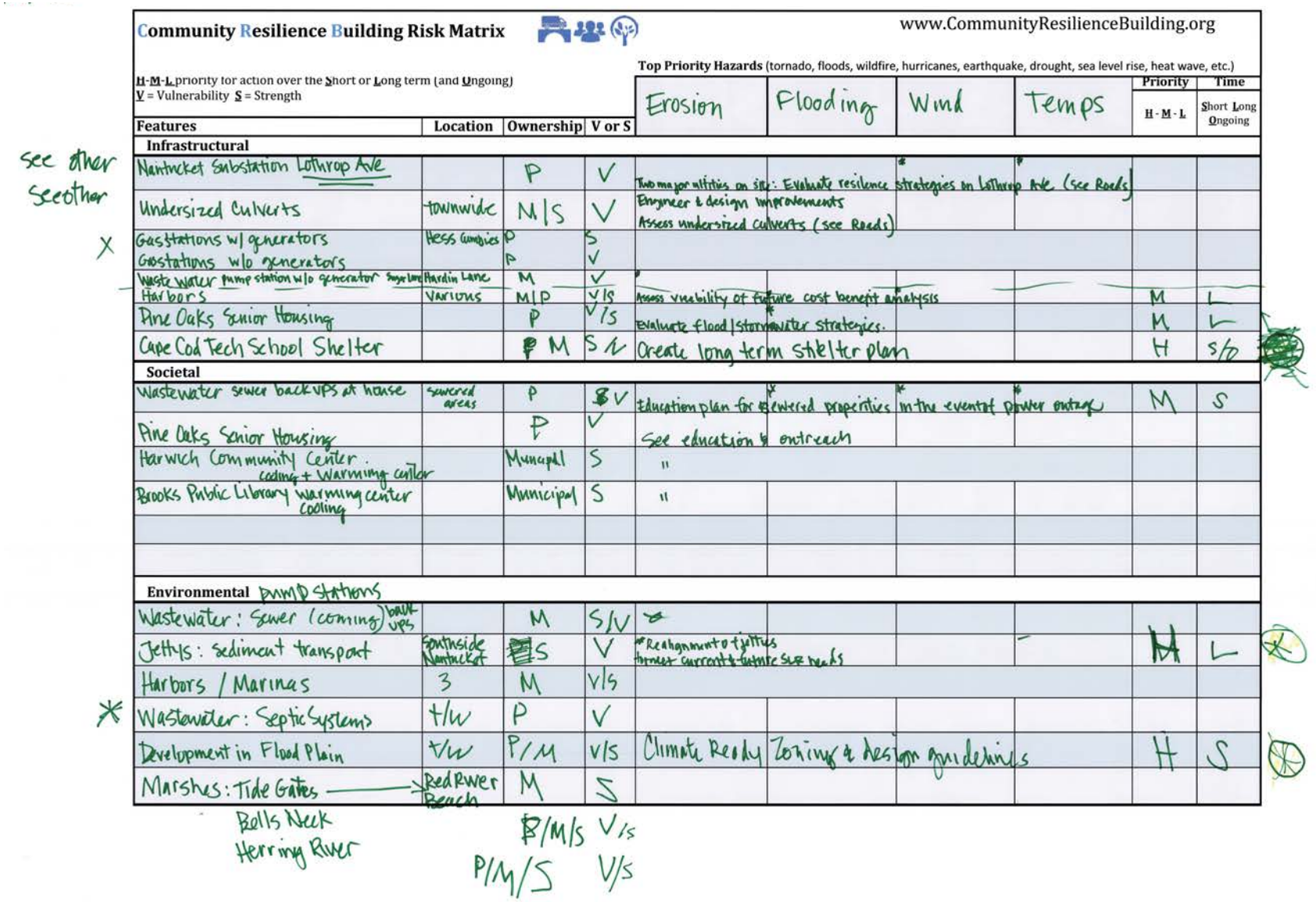
Features	Location	Ownership	V or S	Coastal Erosion	Flooding	Winds	Extreme Temps	Priority H-M-L	Time Short Long Ongoing
Infrastructural									
power	town wide	private	V/S			* Tree Maintenance Underground Utilities	* power outages	H/L	S/O
roads: 28; shore road; North Road; Bells Neck; Bay Rd.; lower county	town wide	S, P, M	V/S	* Vulnerability assessment of Roads & culverts Implement vulnerability priorities from assessment				H H	S O
Outer Cape Health & Fontaine {in flood plain} {out of Flood}	Harwich Port	P	OUT V F S	* service assessment & signage				L	O
Bridge @ lower County Rd. Height		M	V	-	Elevate bridge	-	-	M	L
Allen Harbor Bridge		M	V	-	Elevate bridge	-	-	M	L
Above Ground Water Main	Lothrop Ave	M	V	* Assessment & alternatives analysis				H	S
Societal									
Outer Cape Health & Fontaine		P	S/V						
Food Access / Loss generators. flood plain	stop n Shop Shaws	P	V						
Reverse 911	town wide	M	S						
Neighborhood Association		P	S	Educate Community of Emergency Response & Outreach				H	S
Food Pantry	Queen Anne	P	S	Outreach Plan identifying services for vulnerable communities during				priority L H	hazard S
COA list of vulnerable populations * Updates *		M	S	Update list of vulnerable populations & modernize communication					S
Environmental									
Ground Water Infiltration	town wide	M/P	V	Town wide ground water saltwater monitoring for saltwater intrusion				M	L
Saltwater Intrusion: Marsh Migration	town wide West N	M/P	V/S	Nature based flood protection - marsh enhancement & restoration for to reduce vulnerabilities				H	S/O
Muddy Creek Restoration		S/M	S	Identify other				L	O

H S/O

Identify areas for Marsh migration.
land acquisition to accommodate

* Watershed & supply vulnerability risk assessment

GROUP C RISK MATRIX 1



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.)

Features	Location	Ownership	V or S	Erosion	Flooding	Wind	Temps	Priority H-M-L	Time Short Long Ongoing
Infrastructural									
Nantucket Substation Lothrop Ave		P	V	Two major utilities on site: Evaluate resilience strategies on Lothrop Ave (see Roads)		*	*		
Undersized Culverts	townwide	M/S	V	Engineer & design improvements Assess undersized culverts (see Roads)					
Gasstations w/ generators	Hess Gunpies	P	S						
Gasstations w/o generators		P	V						
Waste water pump station w/o generator Sugar Lane	Hardin Lane	M	V						
Harbors	Various	M/P	V/S	Assess vulability of future cost benefit analysis				M	L
Pine Oaks Senior Housing		P	V/S	Evaluate flood/stormwater strategies.				M	L
Cape Cod Tech School Shelter		P M	S/V	Create long term shelter plan				H	S/D
Societal									
Wastewater sewer backups at house	sewered areas	P	S V	Education plan for sewered properties		* In the event of power outage		M	S
Pine Oaks Senior Housing		P	V	See education & outreach					
Harwich Community Center cooling + warming center		Muncipal	S	"					
Brooks Public Library warming center cooling		Municipal	S	"					
Environmental pump stations									
Wastewater: Sewer (coming) backups		M	S/V	*					
Jettys: sedimant transport	Southside Nantucket	S	V	* Realignment of jetties increase current & future sea levels				H	L
Harbors / Marinas	3	M	V/S						
Wastewater: Septic Systems	t/w	P	V						
Development in Flood Plain	t/w	P/M	V/S	Climate Ready	Zoning & design guidelines			H	S
Marshes: Tide Gates → Red River Beach		M	S						

see other sec other

X

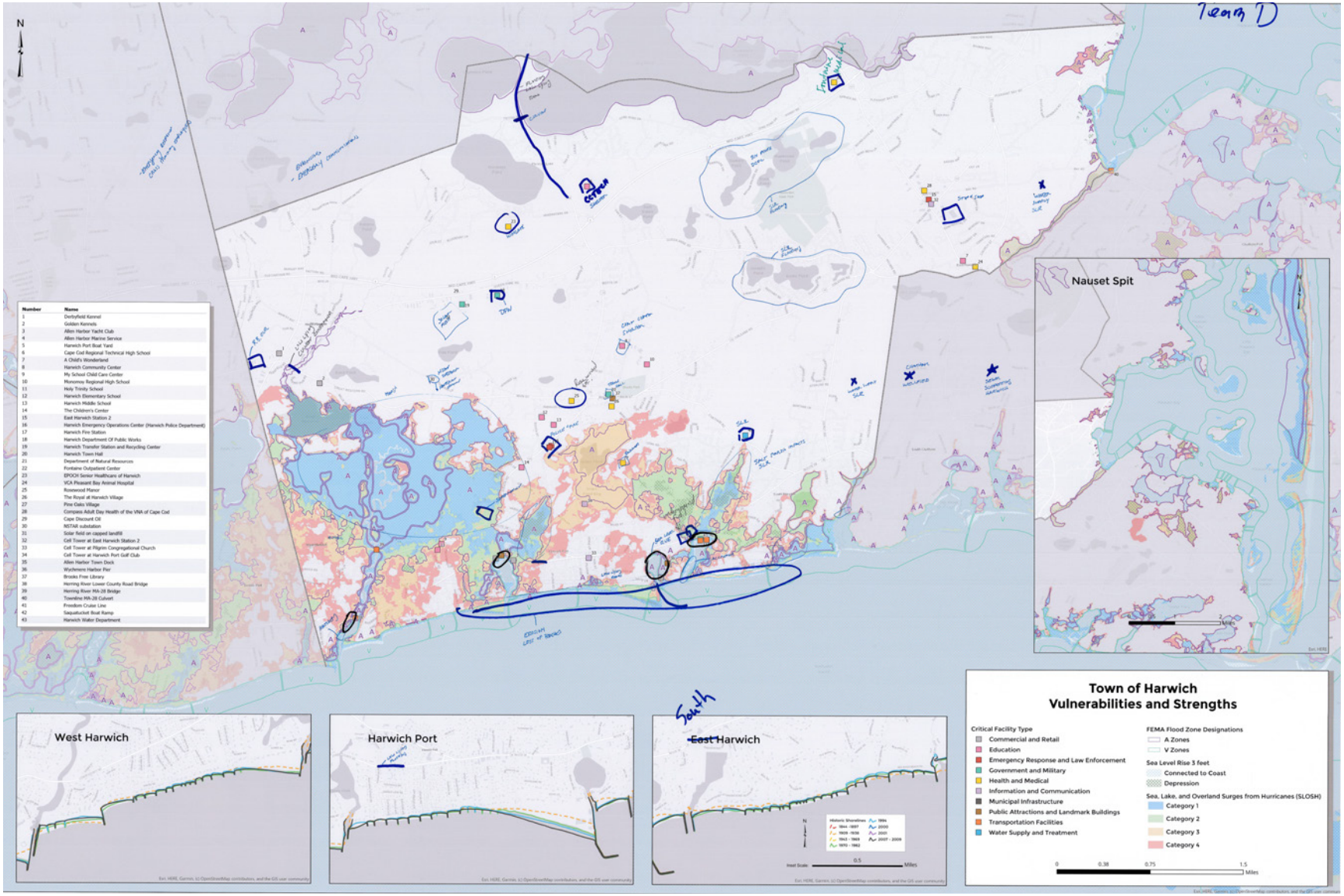
*

Bells Neck
Herring River

P/M/S V/S

P/M/S V/S

GROUP C RISK MATRIX 2



GROUP D BASEMAP

fund ~~e.g. Grant identification~~ writing / Town-To-Town / Regional Coordination of common activities. Team D

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

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

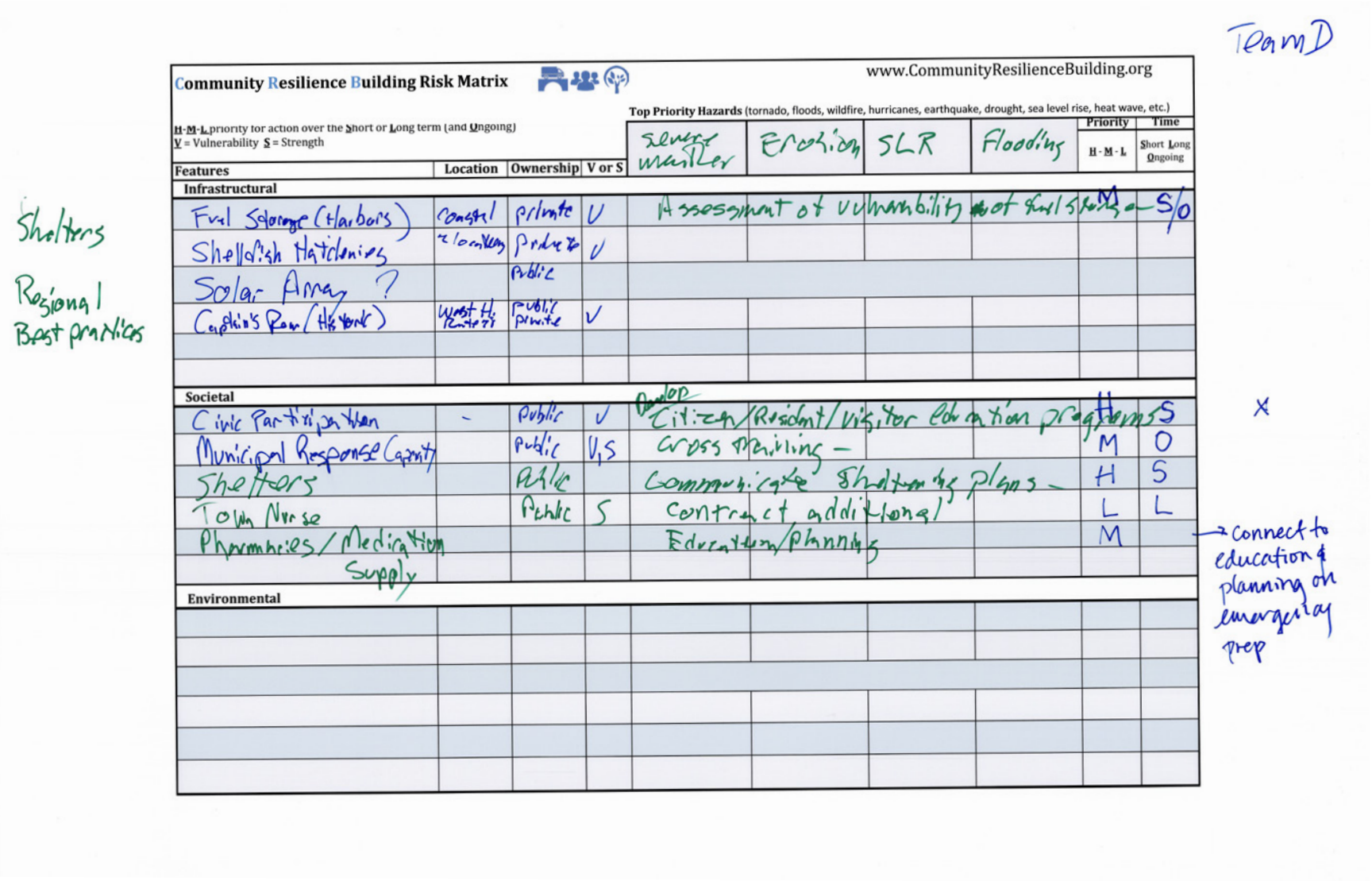
Features	Location	Ownership	V or S	Severe Weather	Coastal Erosion	Sea Level Rise	Flooding	Priority H-M-L	Time Short Long Ongoing
Infrastructural									
Harbors	coastal	Public Private	U, S	✓	Evaluate need to refine FEMA flood maps – more area focused			L	L
Roadways	Evacuation Routes 137/28	Public	V	✓	Low-lying ✓ Road assessment		See study of drainage Town wide.	H	S
Stormwater Systems	Roads/ Shoreline	Public Private	V	Assess low-lying areas – subject to flooding				H	S/O
Water Supply		Public				Seek Hydrogeological study of impact to public supply		M	S
Above Ground Utilities		Private		Investigate microgrids				M	L
Wireless Communications	Multiple	Private	V						
Societal									
Fontaine Medical Center	Rte 137								
Cape Cod Tech	Rte. 124		S,V	Maintain as shelter-support				H	S
Rosewood (Seniors)	Main St.	Private	V	Plan for adequate communications				H	O
Wingate (Seniors)	Headmaster	Private	V	"				H	O
Food Supply (supermarkets)	Station Rd 137	Private	V	Education plan for Home preparation / alternative sources.				H	S
Emergency Communications		Public	S	expand enrollment through current communication channels				H	S
Environmental									
TREES	everywhere	Public Private	V.S.	Education on maintenance & Resources				H	S Best Practices
Marshes	Coastal		S,V	Evaluate options to Mitigate effects / ~~expand~~ allow for ~~expansion~~ Saltmarsh Migration.					
Ponds			S,V	Accelerate Sewer Construction				H	O
Beaches				Develop Sediment/sand management plan for Beaches				H	O
Shellfish Beds	Coastal	Public Private	V	Create shellfish Management Plan / focus on protecting existing / future resource				L	L

Reg. x Regional Assessment

x

/Beach grass erosion control

GROUP D RISK MATRIX 1



Team D

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

Features	Location	Ownership	V or S	sewer main breaks	Erosion	SLR	Flooding	Priority H-M-L	Time Short Long Ongoing
Infrastructural									
Fuel Storage (Harbors)	Coastal	private	V	Assessment of vulnerability of fuel storage				M	S/O
Shellfish Hatcheries	Coastal	Private	V						
Solar Array ?		Public							
Captain's Row (Historic)	West Harwich	Public/private	V						
Societal									
Civic Participation	-	Public	V	Develop Citizen/Resident/visitor education programs				H	S
Municipal Response Capacity		Public	V,S	cross training -				M	O
Shelters		Public		Communicate Sheltering plans -				H	S
Town Nurse		Public	S	contract additional				L	L
Pharmacies / Medication Supply				Education/Planning				M	
Environmental									

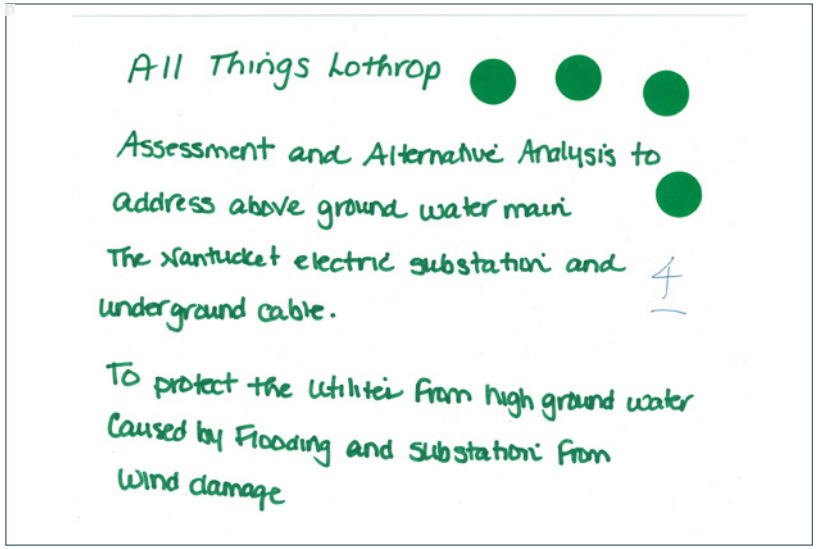
Shelters

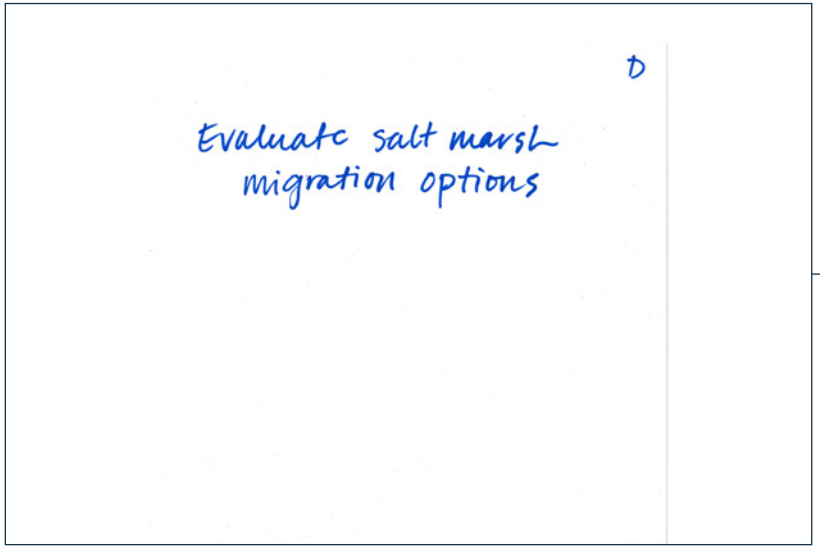
Regional Best practices

X

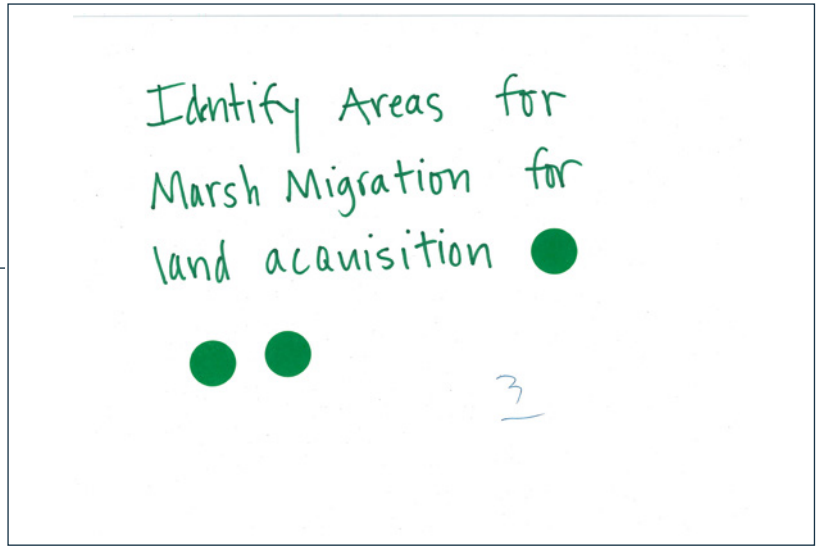
→ connect to education & planning on emergency prep

GROUP D RISK MATRIX 2

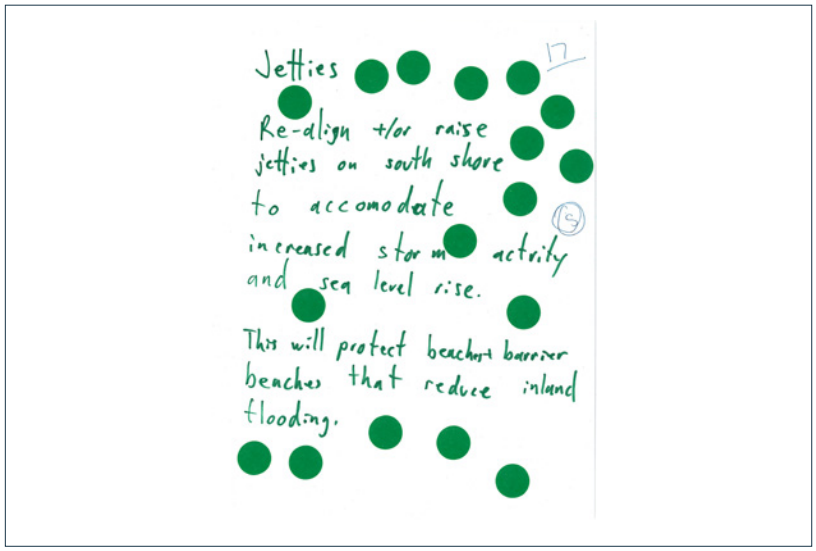


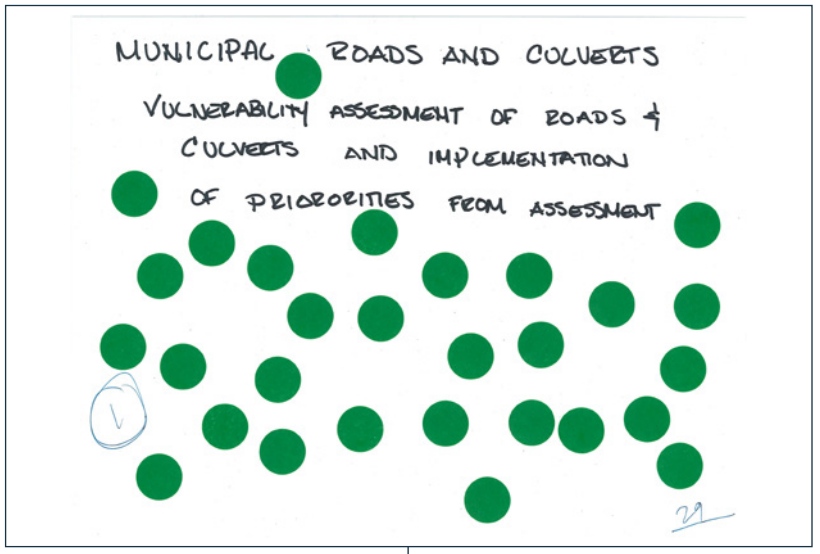


COMBINED



DOT EXERCISE RESULTS





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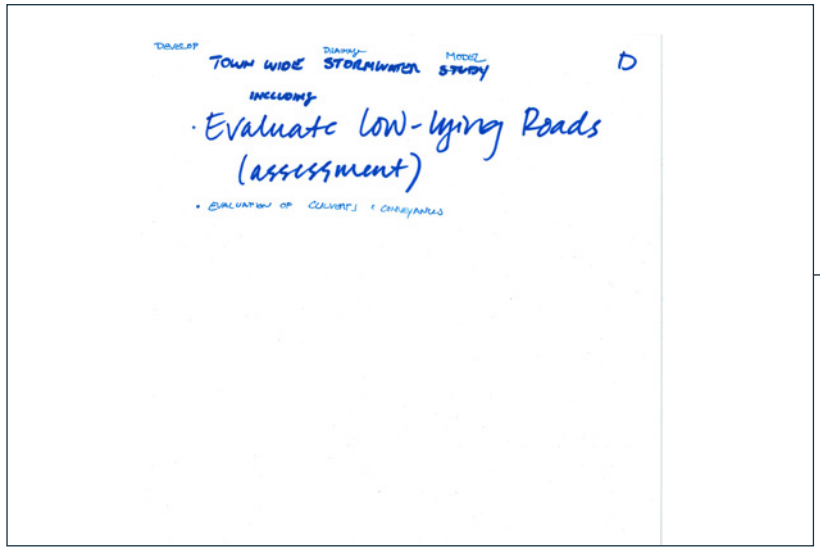

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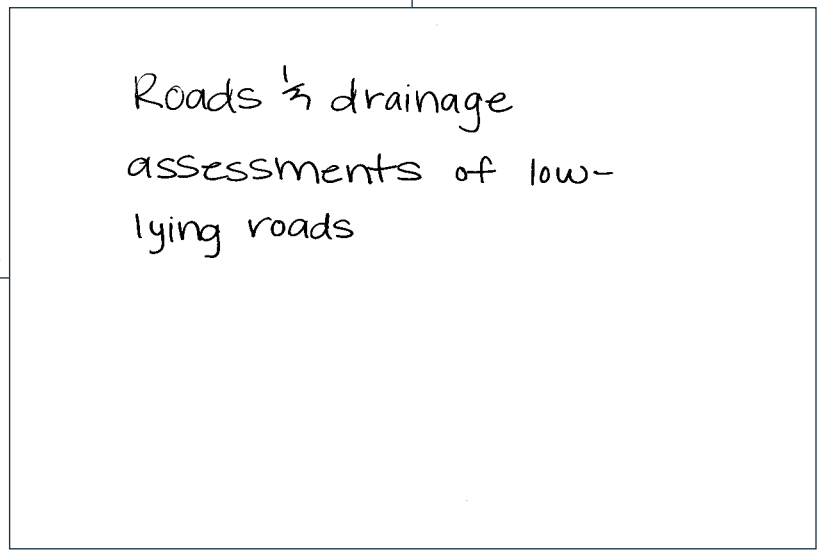
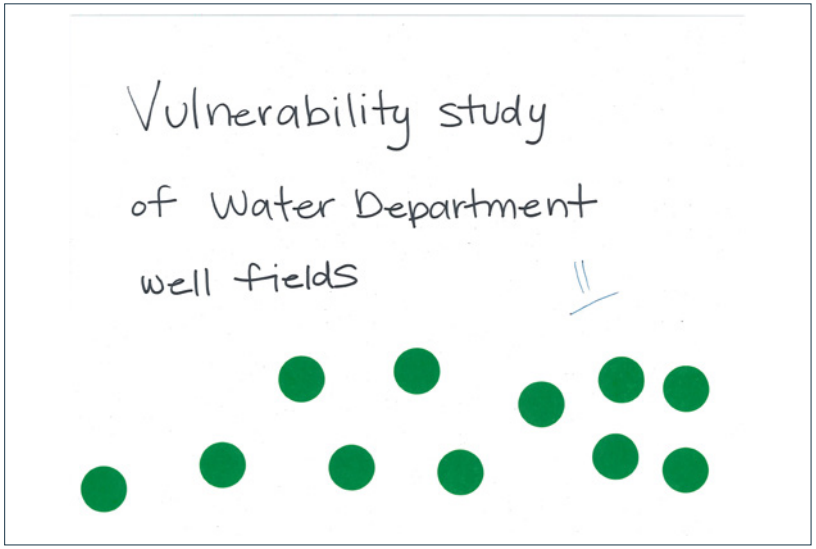
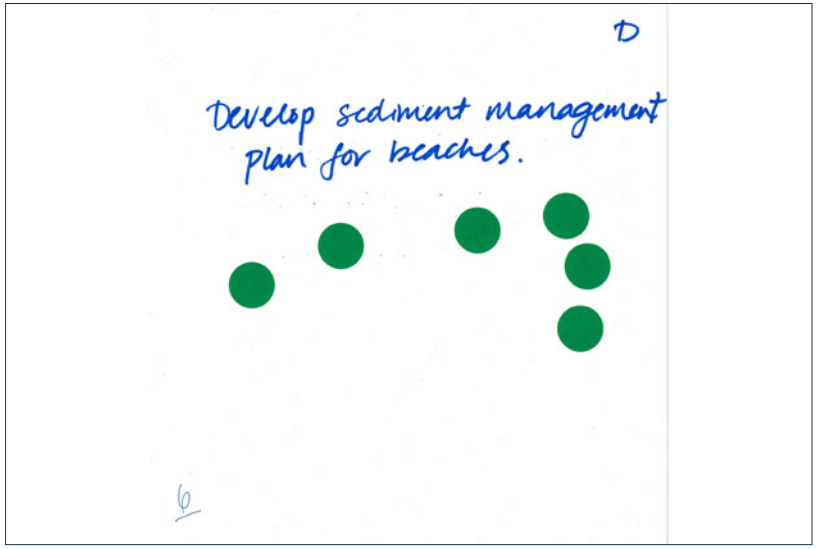
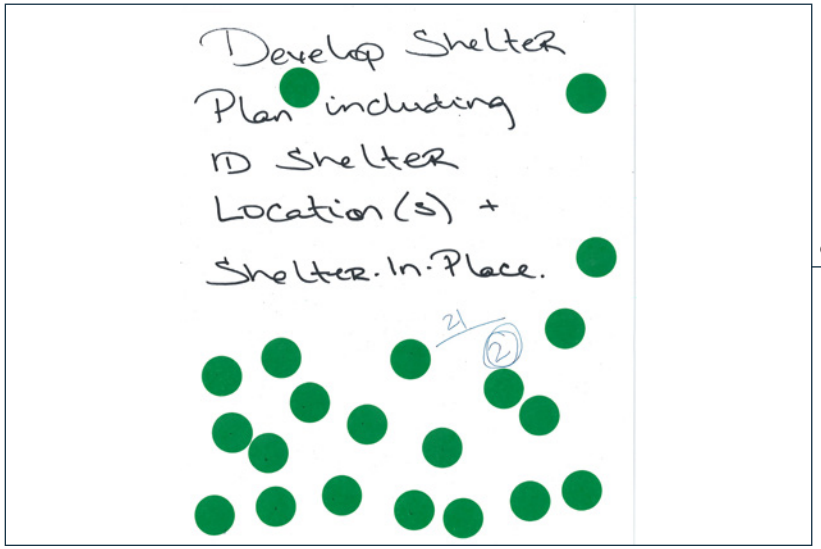
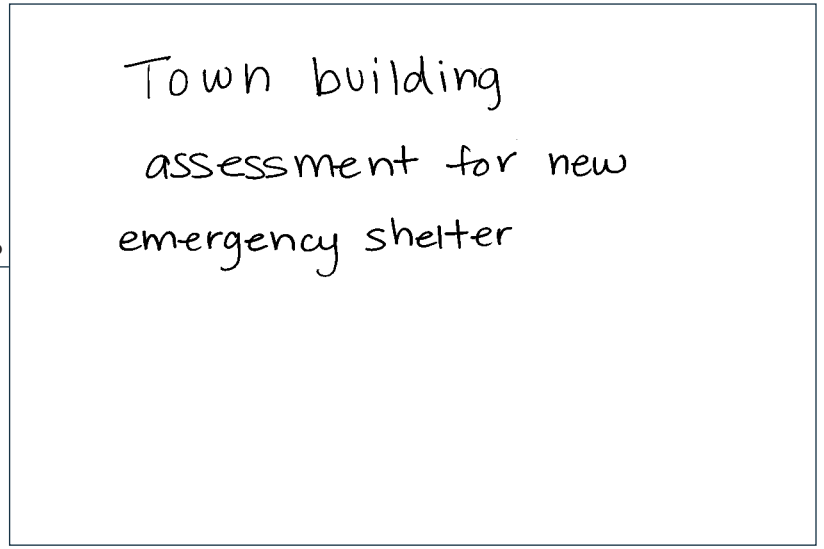



Vulnerability study
of Water Department
well fields
11


D
Develop sediment management
plan for beaches.
6

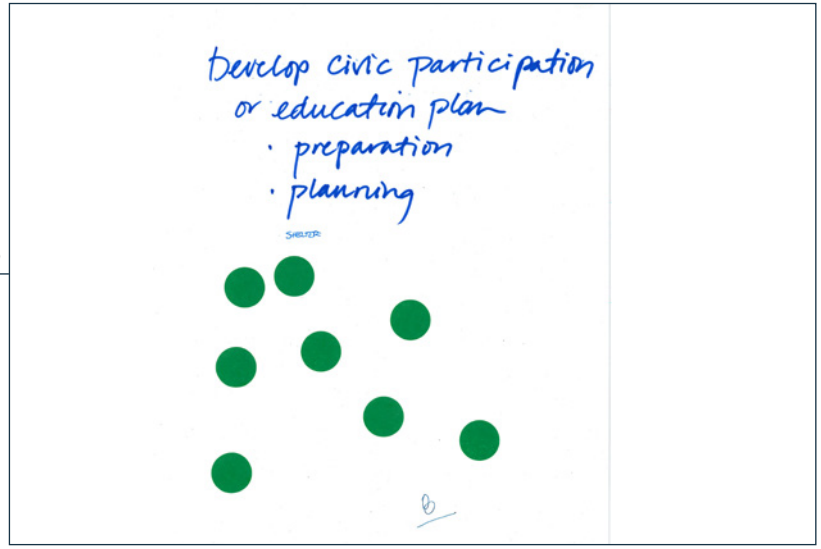

Develop Shelter
Plan including
RD Shelter
Location(s) +
Shelter-In-Place.
21
2

COMBINED

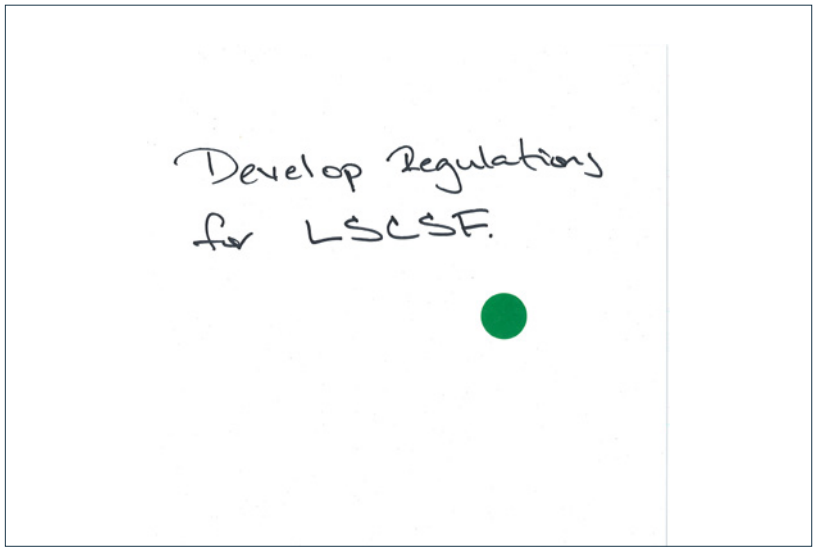

Town building
assessment for new
emergency shelter

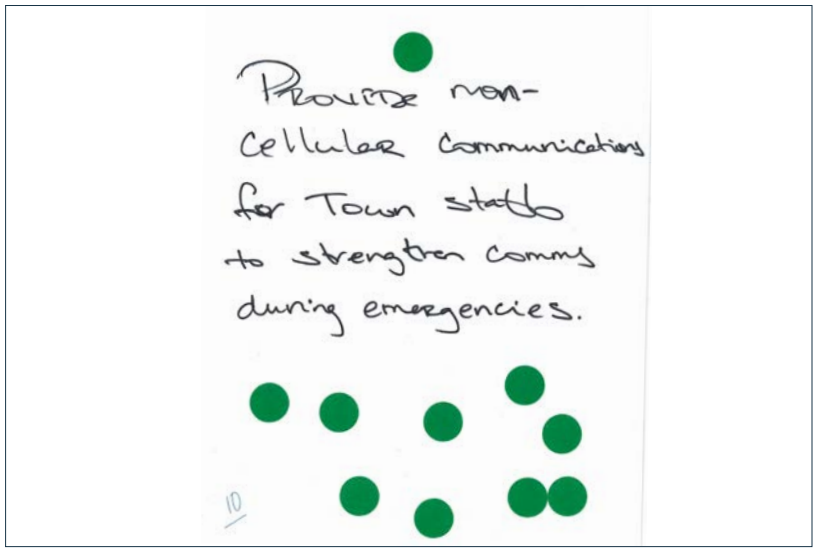
Develop outreach and education program on vulnerability and preparedness through public/private partnership.

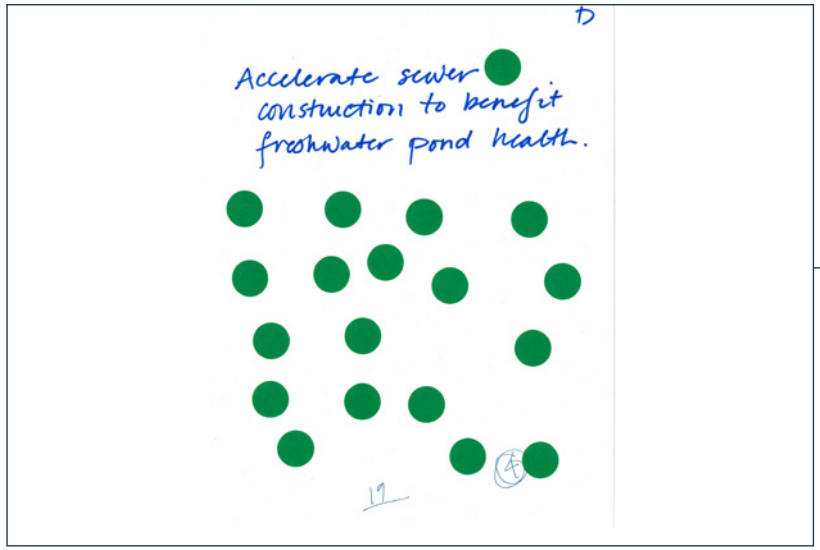
COMBINED



Develop utilities maintenance plan including tree trimming and undergrounding.







COMBINED

Continue sewer
expansion

Municipal Vulnerability Preparedness Workshop

TOWN OF HARWICH
JANUARY 31, 2020

Today's Agenda

Morning

- 8:30 **Introductions, Workshop Overview, and MVP Program Background** – Chloe Schaefer
- 9:00 **Science, Climate Projections, Resources** – Greg Berman
- 10:00 **Break**
- 10:15 **Small Team Exercise**
  - Team Orientation
  - Discuss and Identify Priority Hazards
  - Identify Vulnerable Features and Strengths
  - Prepare for Report-out
- 11:45 **Teams Report on Hazards, Vulnerabilities, Strengths**
- 12:30 **Lunch!**

Today's Agenda

Afternoon

- 1:00 **What's Next for MVP** – Shannon Hulst
- 1:15 **Small Team Exercise**
  - Discuss and Identify Actions
  - Identify Priority and Urgency of Actions
  - Prepare for Report Out
- 2:45 **Break**
- 3:00 **Small Teams Report on Top Actions**
- 3:30 **Dot Exercise**
- 3:45 **Compile Top Actions & Wrap Up**
- 4:30 **Adjourn**

Project Team

MVP PROVIDER | CAPE COD COMMISSION

- Martha Hevenor - *Planner II*
- Heather McElroy - *Natural Resources Manager*
- Erin Perry - *Deputy Director*
- Anne Reynolds - *GIS Director*
- Chloe Schaefer - *Chief Planner*

MVP PROVIDER | COOPERATIVE EXTENSION

- Greg Berman - *Coastal Processes Specialist, Woods Hole Sea Grant/ Cape Cod Cooperative Extension*
- Shannon Hulst - *Deputy Director, Cape Cod Cooperative Extension and Floodplain Specialist & CRS Coordinator, Woods Hole Sea Grant/Cape Cod Cooperative Extension*

TOWN PROJECT MANAGER

- Charleen Greenhalgh - *Town Planner*

WORKSHOP PRESENTATION

MVP Program Background

EXECUTIVE ORDER 569, 9.16.16

An Integrated Climate Change Strategy for the Commonwealth

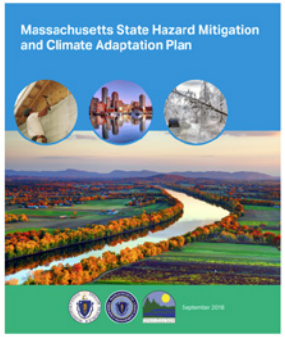
- Reducing greenhouse gas emissions to combat climate change
- Preparing for the impacts of climate change
  - State Adaptation Plan
  - Agency Vulnerability Assessments
  - Municipal Support
  - Climate Coordinators

ENVIRONMENTAL BOND BILL, 8.21.18

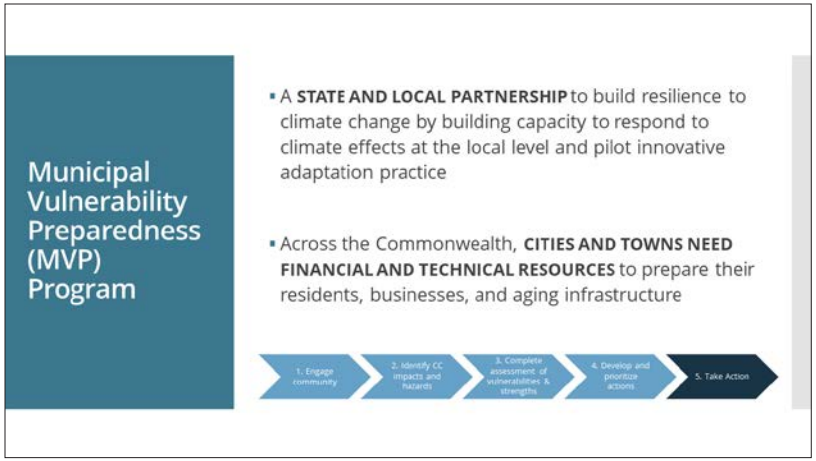
- $2.4 billion bond bill
- $500 million for responding to and preparing for climate impacts
- $75 million for MVP planning and action grants

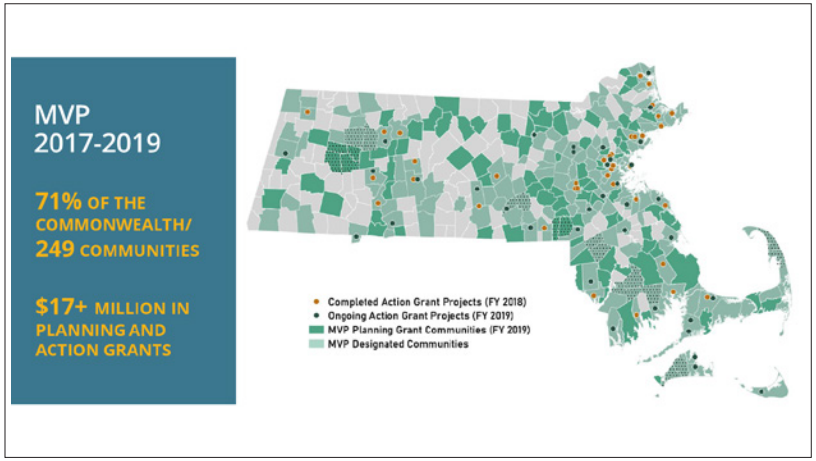
MASSACHUSETTS STATE HAZARD MITIGATION AND CLIMATE ADAPTATION PLAN

- www.resilientma.com
- **INTEGRATED PLAN:** First in the nation Climate Adaptation and Hazard Mitigation Plan
- **MAINSTREAMING CLIMATE CHANGE:** Incorporating climate change into current planning, budgeting, and policy frameworks



WORKSHOP PRESENTATION





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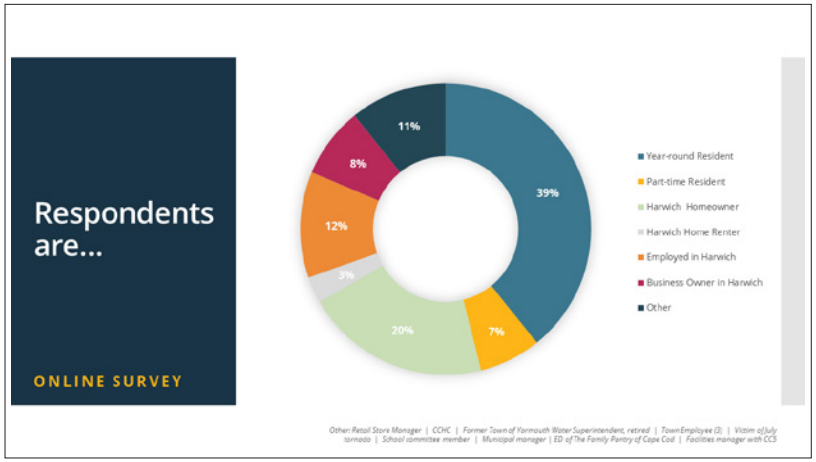
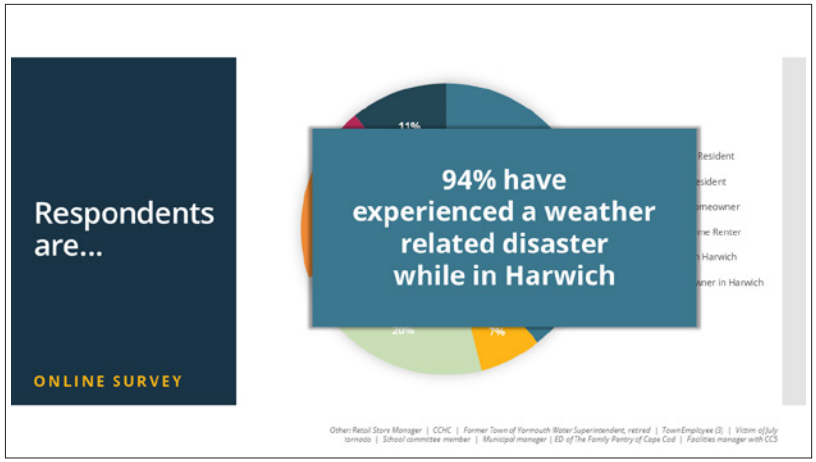
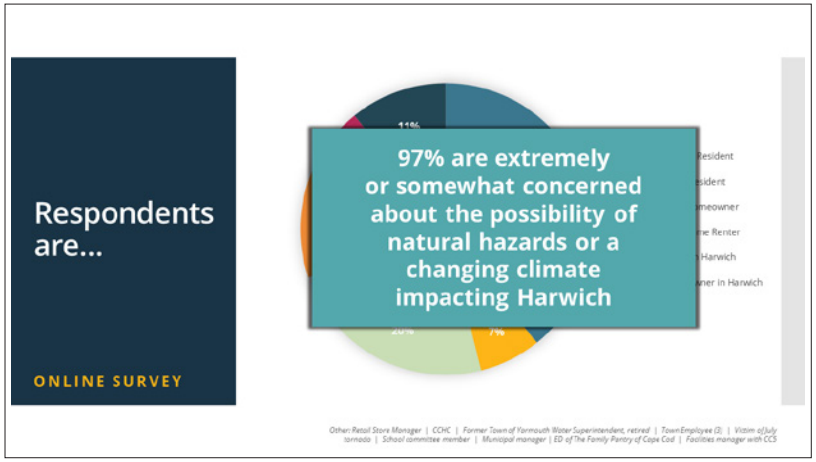
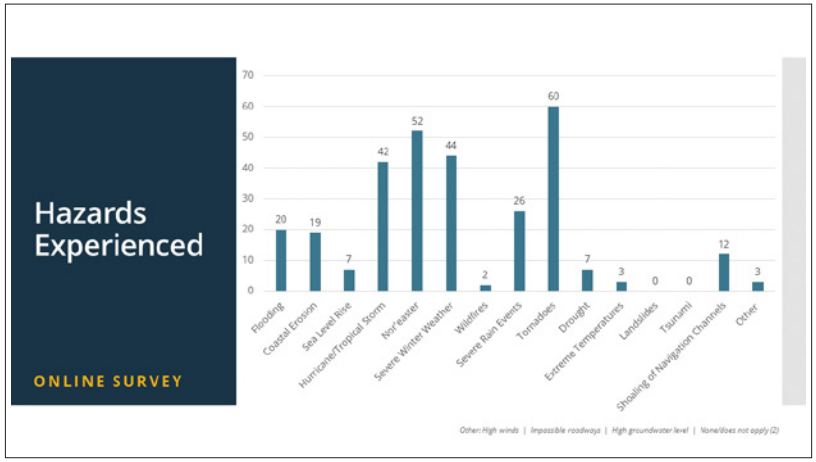
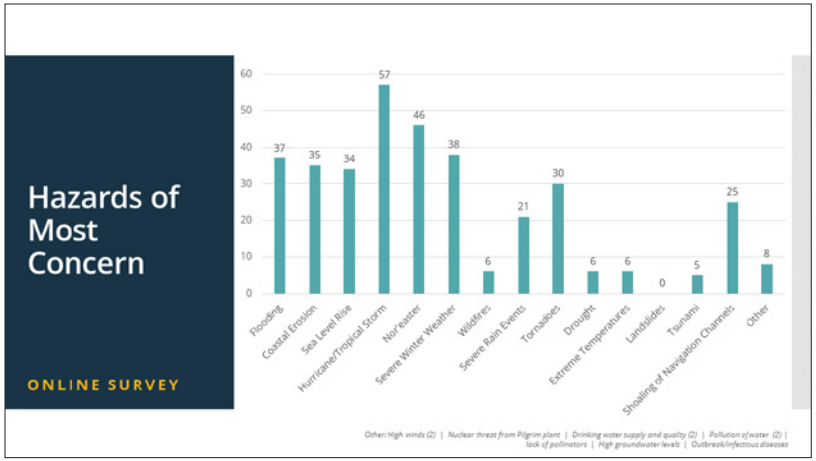

Respondents are...
ONLINE SURVEY
39%
7%
20%
3%
12%
8%
11%
Year-round Resident
Part-time Resident
Harwich Homeowner
Harwich Home Renter
Employed in Harwich
Business Owner in Harwich
Other


Respondents are...
ONLINE SURVEY
94% have experienced a weather related disaster while in Harwich


Respondents are...
ONLINE SURVEY
97% are extremely or somewhat concerned about the possibility of natural hazards or a changing climate impacting Harwich


Hazards Experienced
ONLINE SURVEY
70
60
50
40
30
20
10
0
20
19
7
42
52
44
2
26
60
7
3
0
0
12
3
Flooding
Coastal Erosion
Sea Level Rise
Hurricane/Tropical Storm
Nor'easter
Severe Winter Weather
Wildfires
Severe Rain Events
Tornadoes
Drought
Extreme Temperatures
Landslides
Tsunami
Shoaling of Navigation Channels
Other



WORKSHOP PRESENTATION

Examples of Vulnerability/ Hazards

FROM STATE HAZARD MITIGATION PLAN

CHANGES IN PRECIPITATION
- Inland Flooding
- Drought
- Landslide

SEA LEVEL RISE
- Coastal Flooding
- Coastal Erosion
- Tsunami

RISING TEMPERATURES
- Average/Extreme Temperature
- Wildfires
- Invasive Species

EXTREME WEATHER
- Hurricanes/Tropical Storms
- Severe Winter Storm / Nor'easter
- Tornadoes

EARTHQUAKE

HAZARD Sea Level Rise

Nor'Easter (January 2018)

Hurricane Sandy (10/29-30/2012)
Predicted High WL = 10.3 MLLW
Actual High WL = 12.8 MLLW
Max Surge: 4.5'
High Tide Surge: 2.5'

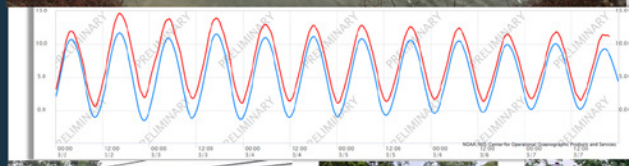
Nor'easter Nemo (2/8-2/9/2013)
Predicted High WL = 10.0 MLLW
Actual High WL = 13.0 MLLW
Max Surge: 3.9'
High Tide Surge: 3.0'

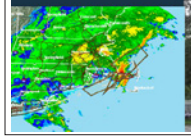
Nor'easter Grayson (1/4-5/2018)
Predicted High WL = 12.1 MLLW
Actual WL = 15.2 MLLW
Max Surge: 3.1'
High Tide Surge: 3.1'

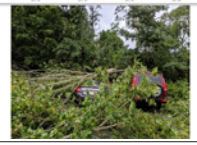
SL has risen ~4.5" in the 40 years since 1978....so SLR is the reason the record was broken!!!

In Boston, a storm tide of 15.16' was recorded which beat the record set by the Blizzard of 1978 (15.0') **~2"**

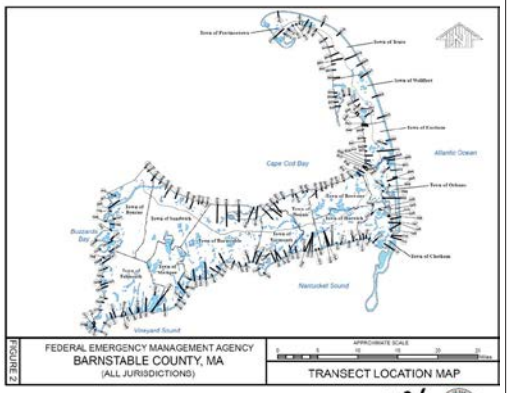
HAZARD Storms



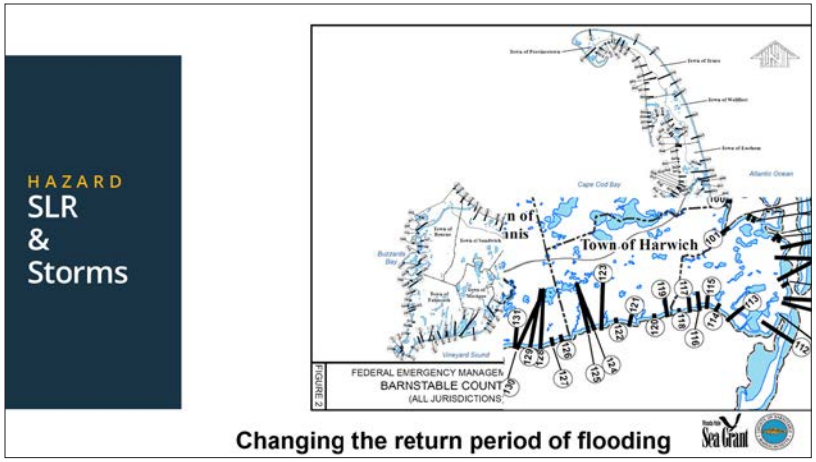


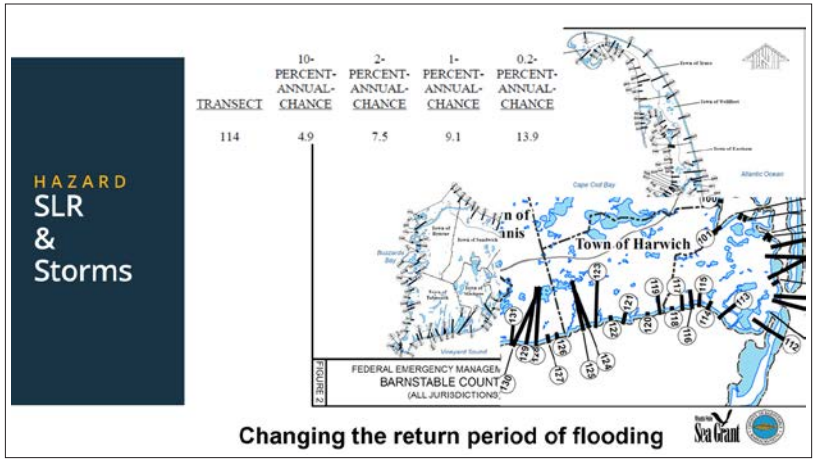


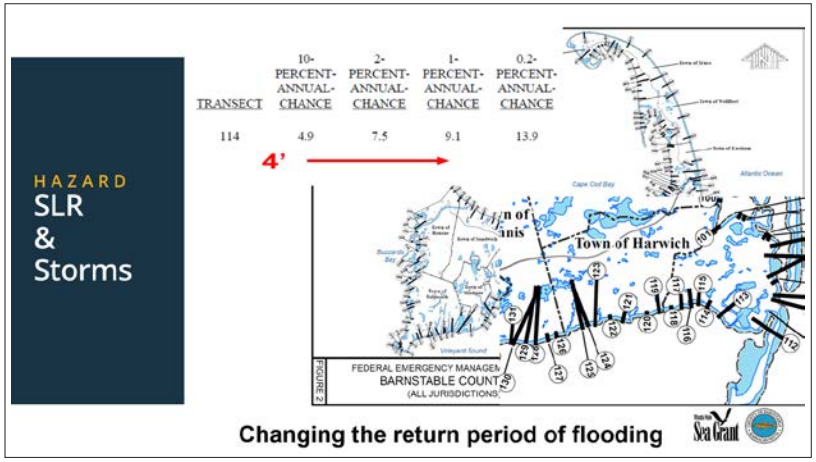
HAZARD SLR & Storms

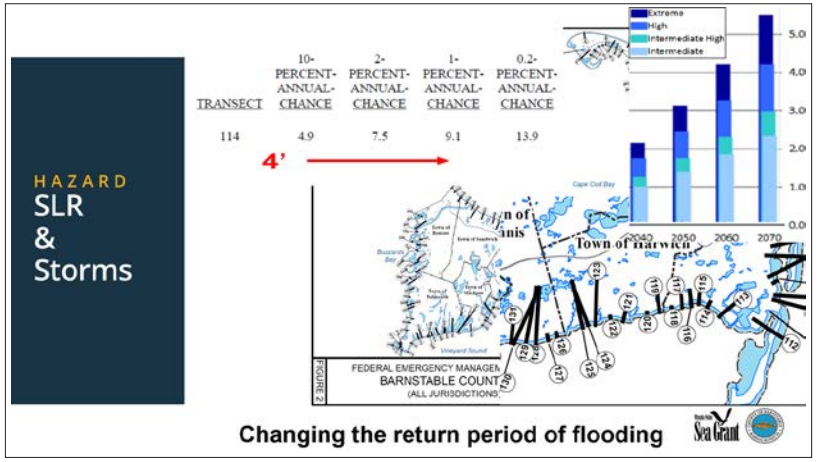


Changing the return period of flooding



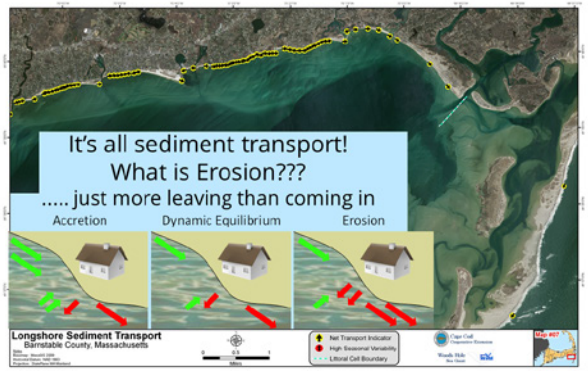






WORKSHOP PRESENTATION

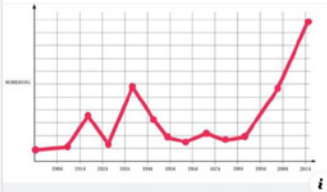
HAZARD
Erosion



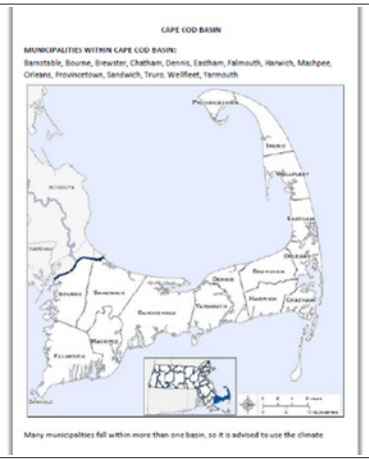
Overview of Data and Maps

The Onion
19 mins ·

"As recently as 15 years ago, there were relatively few statistics that were concerning, let alone troubling, but our research found that the vast majority of current statistical figures are unsettling, alarming, or even, in some cases, chilling."



THEONION.COM
Study Finds 79% Of Statistics Now Sobering
CAMBRIDGE, MA—Noting a sharp increase over rec...



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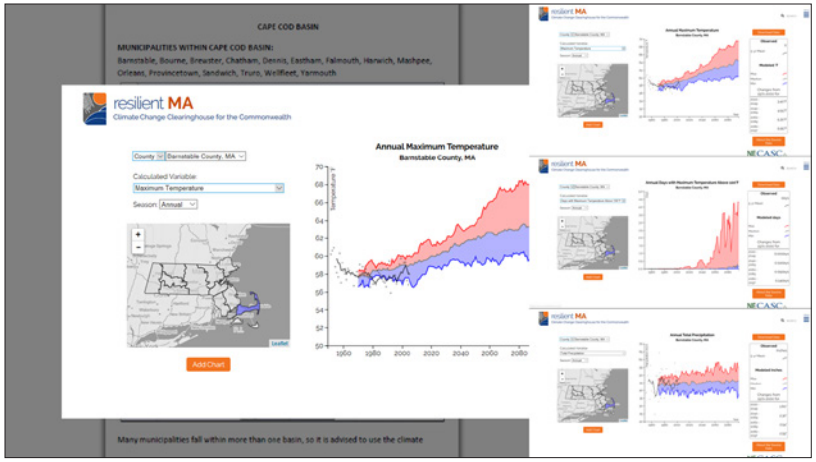
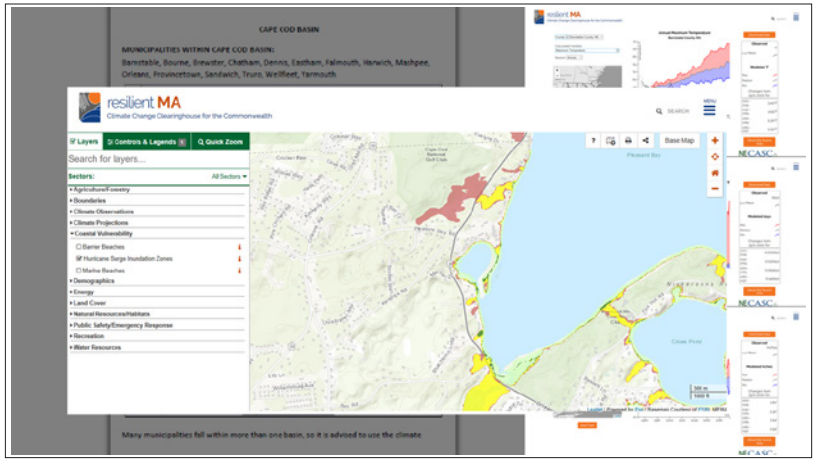
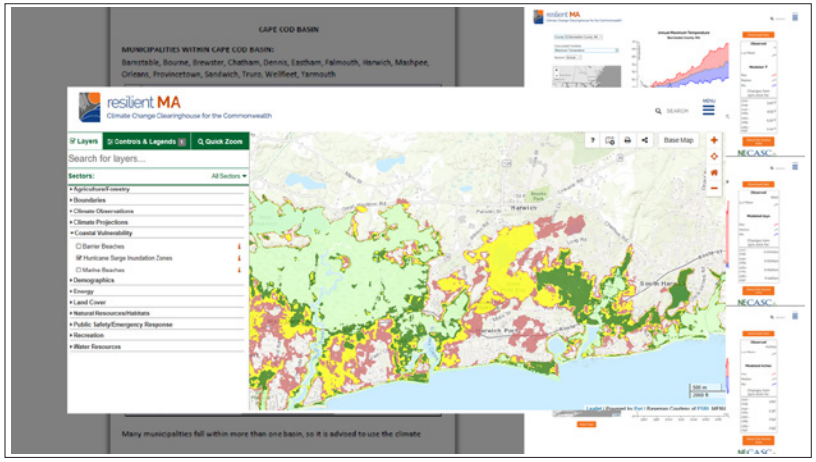
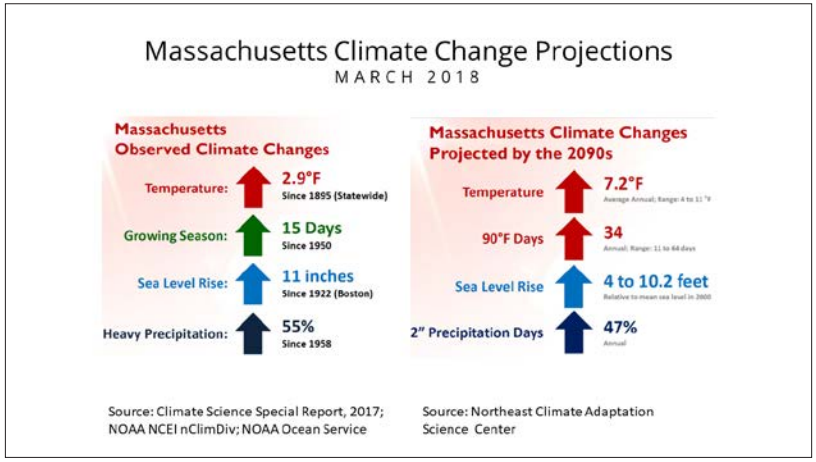


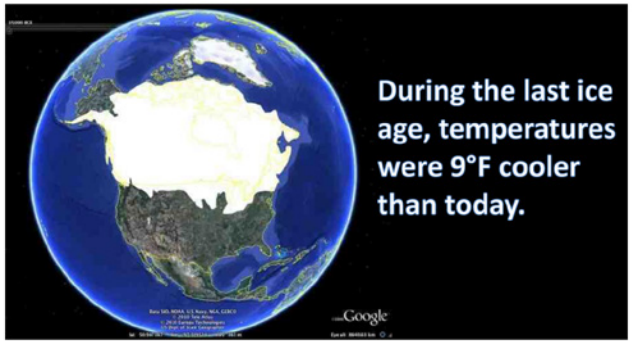




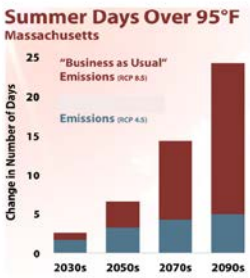


WORKSHOP PRESENTATION

Massachusetts Climate Changes Projected by the 2090s | **Temperature** ↑ 7.2° F Average Annual



Massachusetts Climate Changes Projected by the 2090s | **Temperature** ↑ 7.2° F Average Annual ↑ 34 Annual



Data courtesy A. Karmalkar, Northeast Climate Adaptation Science Center. Figure by D. Brown

More Warm Winter Days, Less Heating Demand

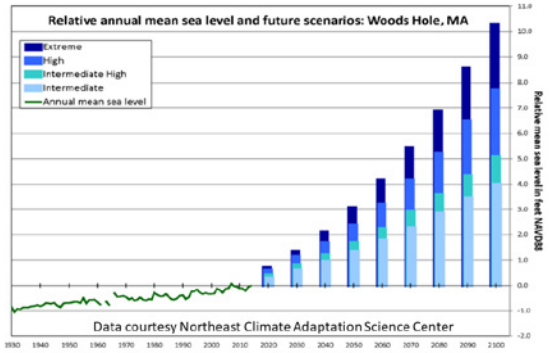
↓ 26.2% by the 2090s

More Warm Summer Days, More Cooling Demand

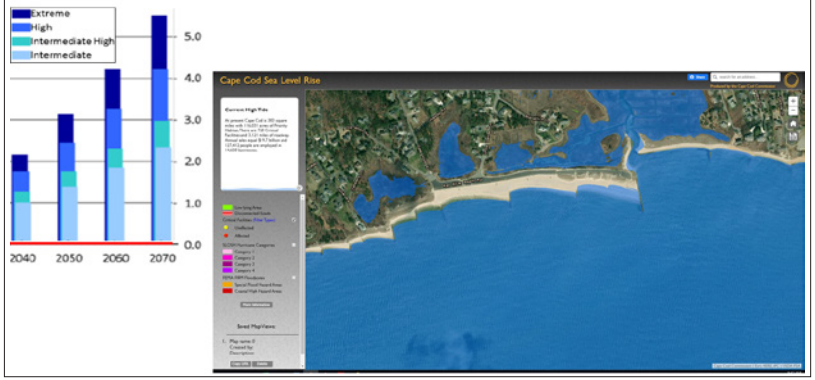
↑ 178% by the 2090s

Source: Northeast Climate Adaptation Science Center, ResilientMA.org, accessed 2018.

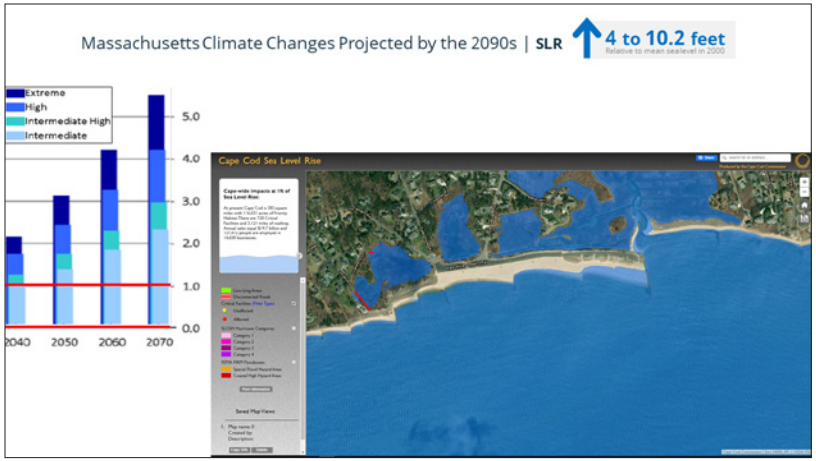
Massachusetts Climate Changes Projected by the 2090s | **SLR** ↑ 4 to 10.2 feet Relative to mean sea level in 2000

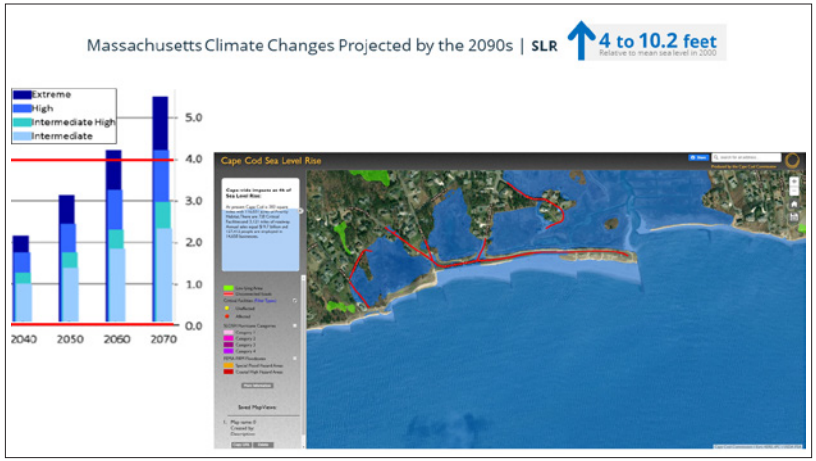


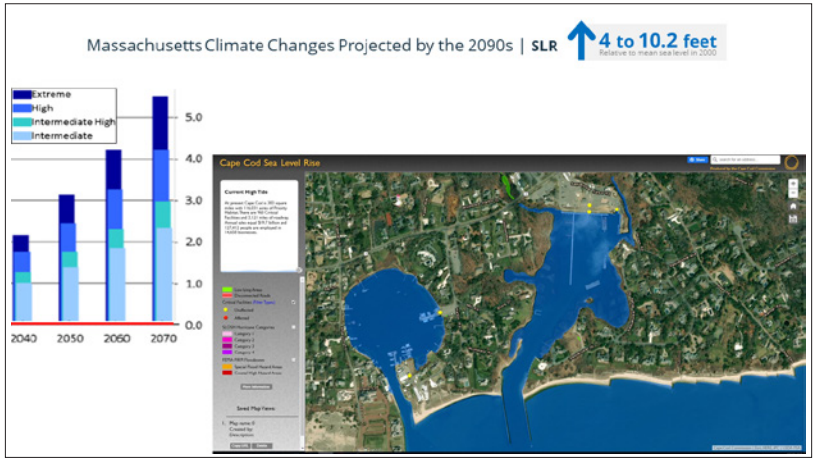
Massachusetts Climate Changes Projected by the 2090s | **SLR** ↑ 4 to 10.2 feet Relative to mean sea level in 2000



WORKSHOP PRESENTATION







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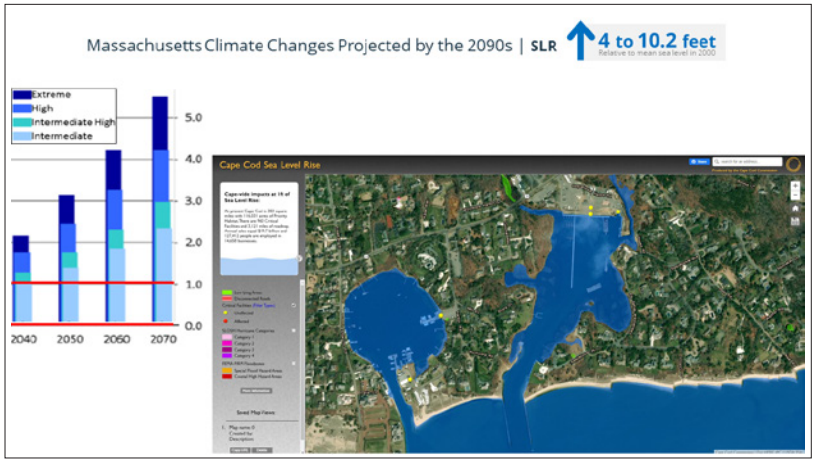
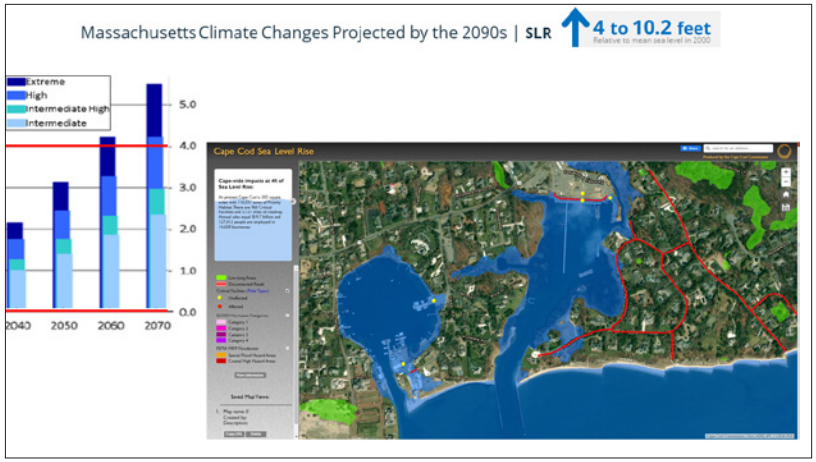
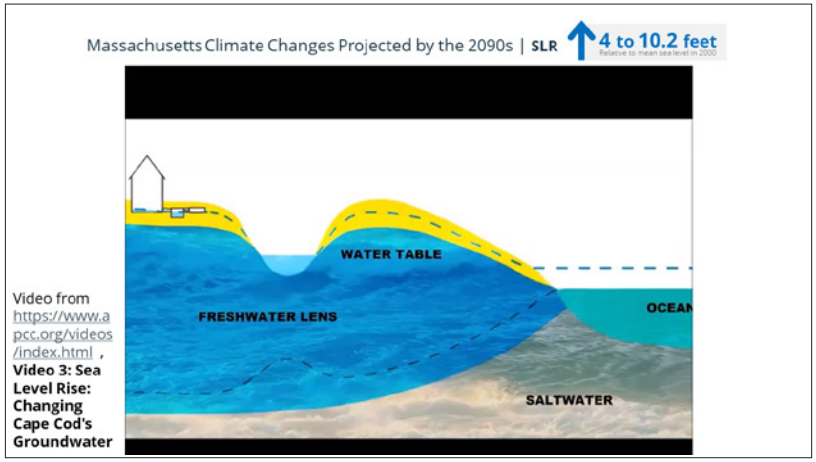
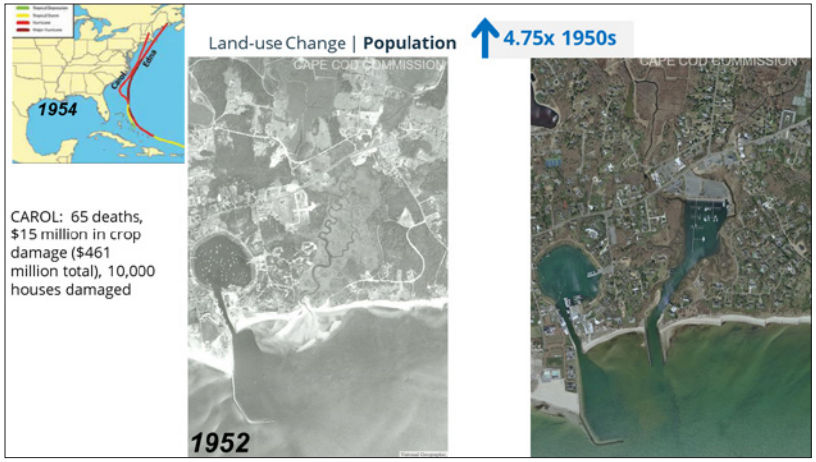


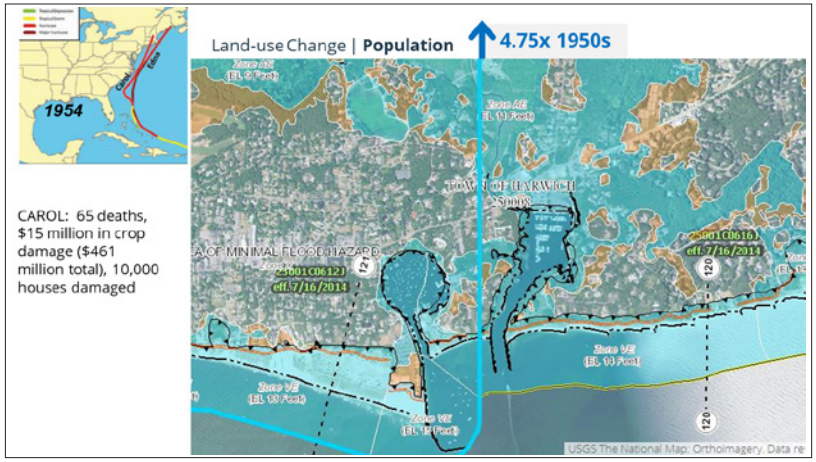


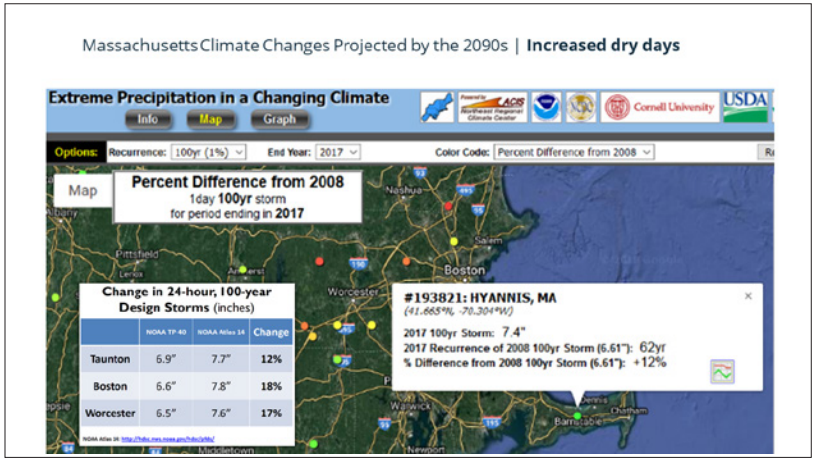


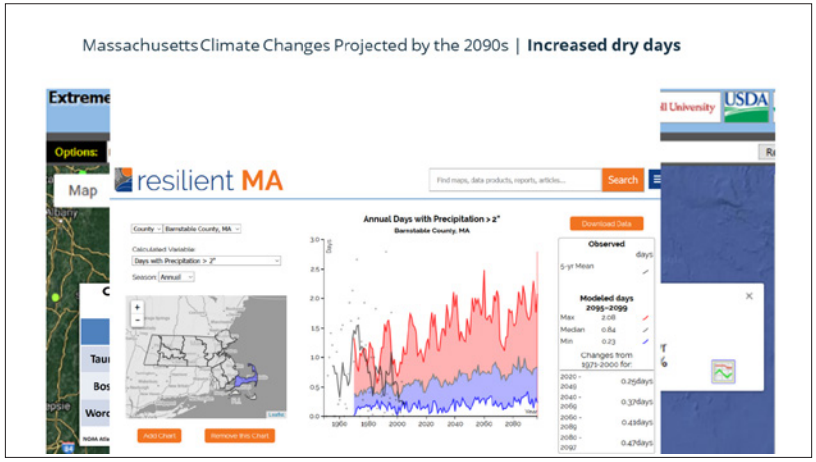
Video from https://www.apcc.org/videos/index.html , **Video 3: Sea Level Rise: Changing Cape Cod's Groundwater**

WORKSHOP PRESENTATION

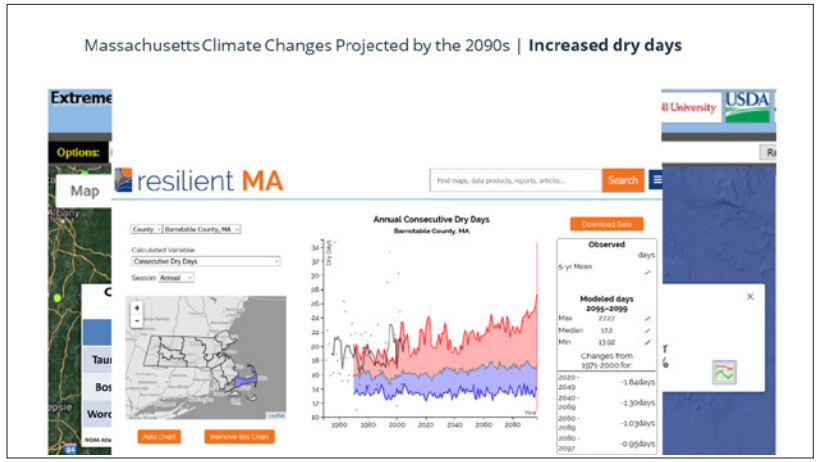


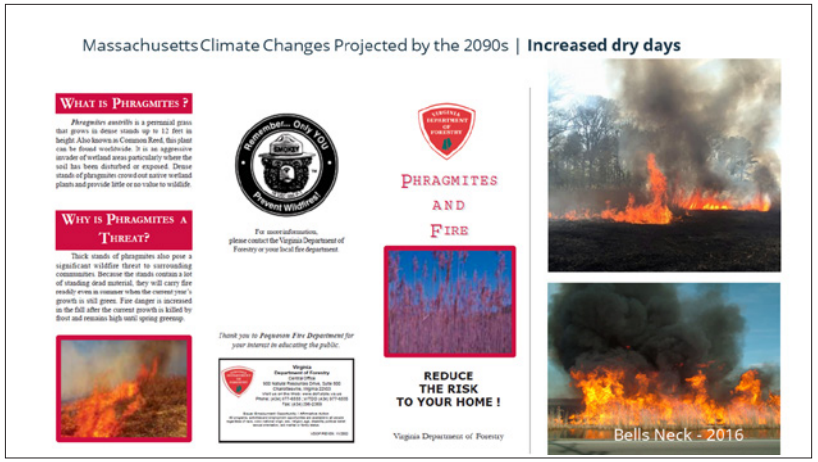






WORKSHOP PRESENTATION





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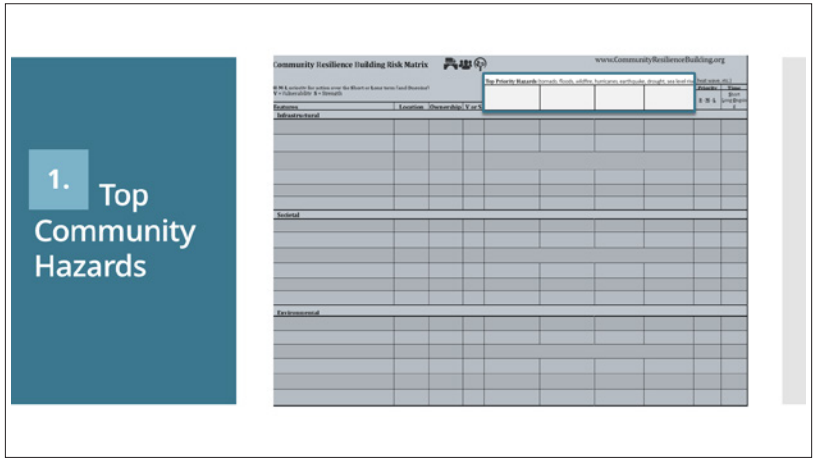

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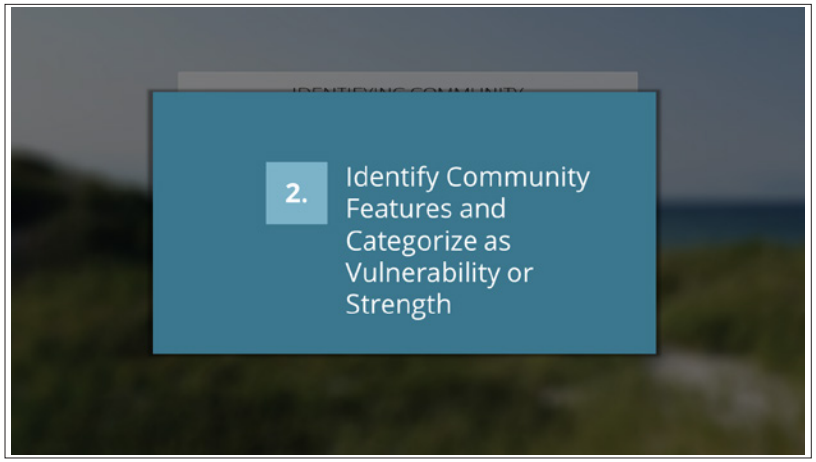
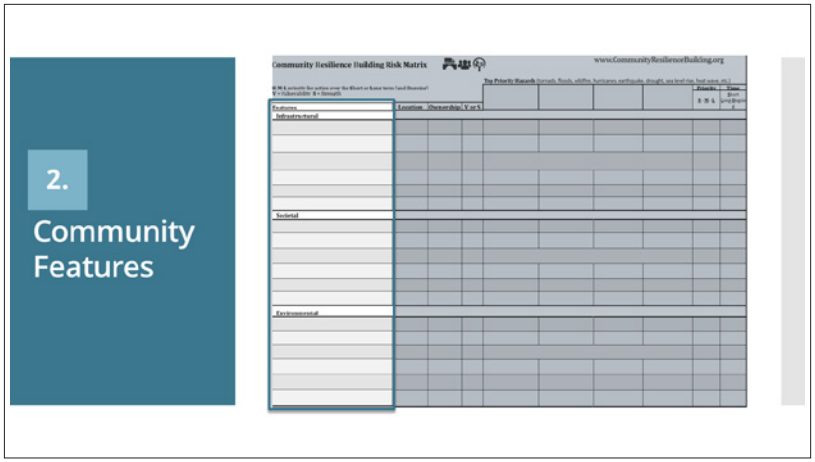
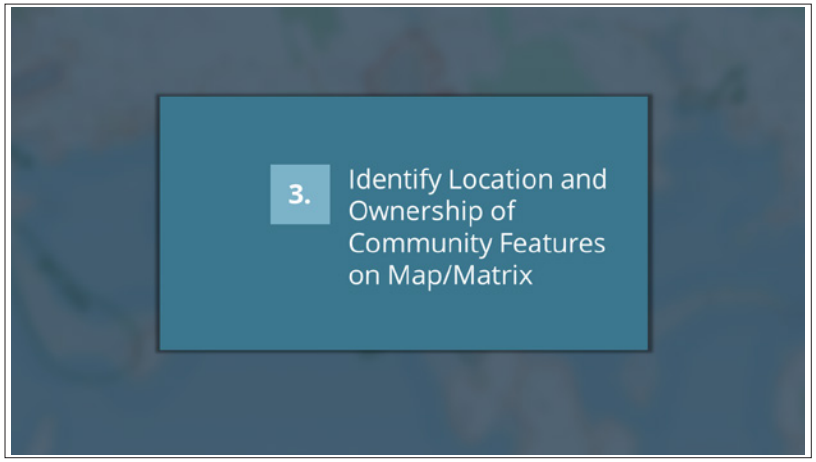
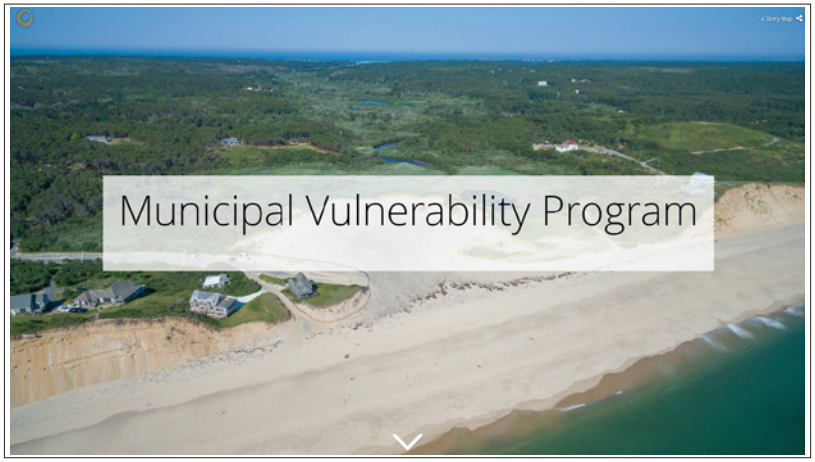
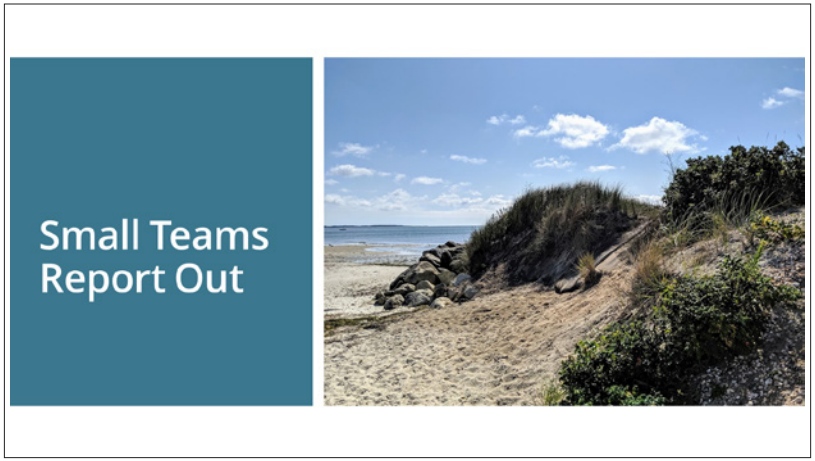


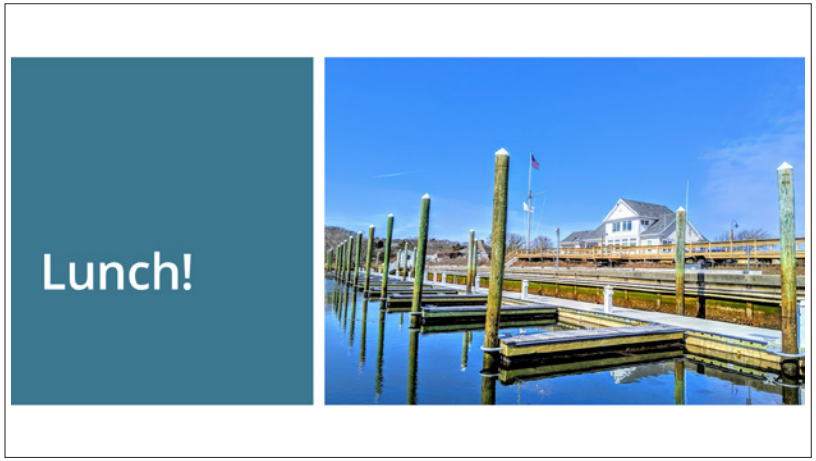






WORKSHOP PRESENTATION





WORKSHOP PRESENTATION

What's Next for MVP?

Shannon Hulst, Floodplain Specialist & CRS Coordinator,
Woods Hole Sea Grant/Cape Cod Cooperative Extension
Deputy Director, *Cape Cod Cooperative Extension*

Sources of Available Grants

- Municipal Vulnerability Preparedness (MVP) Program
- Coastal Zone Management (CZM) Program's Coastal Resilience Grant Program
- FEMA's Hazard Mitigation Grant Program
- Others

MV Gr

- Detailed Vulnerability and Risks Assessment Further Planning
- Community outreach and education
- Local Bylaws, Ordinances, Plans, and Other Management Measures
- Redesigns and Retrofits

INELIGIBLE PROJECTS: Ineligible projects under the MVP Action Grant include acquisition of diesel generators, and projects that seek to repair to previous conditions without consideration of climate change projections or more resilient alternatives. Other project types not meeting the goals of this BID may be deemed ineligible at the discretion of the Secretary.

- Impacts
- Acquisition of land to achieve a resiliency objective
- Ecological Restoration and Habitat Management to Increase Resiliency
- Subsidized Low Income Housing Resilience Strategies
- Mosquito Control Districts

MVP Action Grants

Consider the timeframe of the grant !!!

PROPOSALS SHOULD ADDRESS STAGES

- Planning, feasibility assessment, and siting
- Design
- Permitting
- Construction, installation, and monitoring

MVP Action Grant Details

- One-year timeframe
- $25,000 - $2,000,000 for single towns
- Up to $5,000,000 for regional projects
- Must be used to advance priority adaptation actions identified in MVP reports
- 25% match

MVP Action Grant Examples

- **Adams** - **Assessment** and Conceptual Design for Adaptation and Resiliency
- **Arlington** – Mill Brook Corridor Flood Management Demonstration Project
- **Belchertown** - Town-Wide Road Stream Crossing Assessment and Climate Change Adaptation
- **Boston** - Climate Ready Zoning and Design Guidelines
- **Charlton & Spencer** - Integrated Water Infrastructure Vulnerability Assessment and Resiliency
- **Deerfield** - Culvert Redesign and Retrofit and Bylaw Update
- **Essex** - Living Shoreline Feasibility Study for Essex Bay
- **Gloucester** - Watershed and Water Supply Vulnerability, Risk Assessment and Management
- **Holden** - Water-Sewer Infrastructure Green Emergency Power Study
- **Medford** - Drainage Model and Conceptual Strategies to Reduce Future Flooding
- **Medford** - Open Space Plan Update
- **Mendon** - Integration of Low Impact Development Standards into Local Bylaws **Regulations**
- **Montague** - City Road Flooding Protection Project- **Design and Permitting**
- **Natick** - Tree Planting Plan to Mitigate Heat Islands and Reduce Runoff
- **Newbury** - Assessing Storm Energy Reduction by the Vegetated Salt Marsh Platform
- **Newburyport** - Wastewater Treatment Plant Climate Resilience
- **Northampton** - **Nature-Based Flood Protection** to Reduce Vulnerabilities
- **Salem** - Sanitary Sewer Trunk Line Relocation Assessment
- **Sandwich** - Climate Change Vulnerability Assessment-Adaptation Planning
- **Weymouth** - Fort Point Road Coastal Infrastructure Resilience Project
- **Winthrop** - Ingleside Park **Feasibility Study** and Permitting

CZM's Coastal Resilience Grant Program

- Vulnerability and Risk Assessment
- Public Education and Communication
- Local Bylaws, Adaptation Plans, and Other Management Measures
- Redesigns and Retrofits
- Natural Storm-Damage Protection Techniques

MVP vs CZM

MVP	CZM
All climate-related issues	Coastal only
Multiple opportunities throughout the year	Opens once a year (Spring)
$25K - $2 million	Up to $750,000
25% match	25% match
If it fits CZM, apply to both programs	If it fits MVP, apply to both programs

WORKSHOP PRESENTATION

FEMA's Hazard Mitigation Grant Program

Hazard Mitigation Grant Program (HMGP)*
Pre-Disaster Mitigation Grant (PDM)
Flood Mitigation Assistance Grant (FMA)

**Available only After Federally Declared Disaster*
"...not intended to fund repair, replacement, or deferred maintenance activities."

- Storm-water upgrades
- Drainage and culvert improvements
- Property acquisition
- Slope stabilization
- Infrastructure protection
- Structure elevations
- Hazard Planning

Small Team Exercise

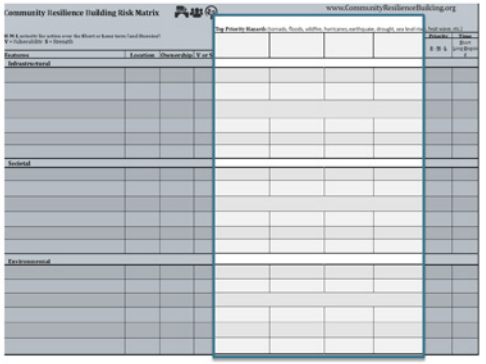
Small Team Exercise

GETTING STARTED
- Identify Small Team Spokesperson
- Clarifying questions

EXERCISE

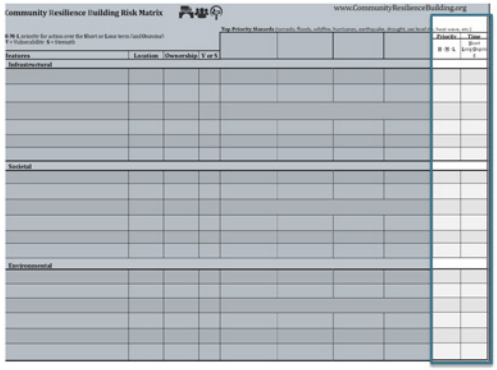
1. Identify Actions to Reduce Vulnerability or Reinforce Strengths
2. Assign Priority and Urgency of Each Action
   - Infrastructure
   - Societal
   - Environmental
3. Identify Top 5 Priority Actions

1. Identify Actions

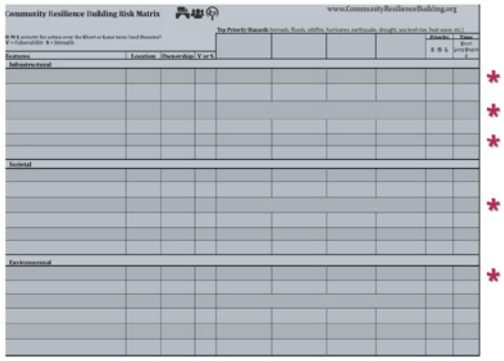


WORKSHOP PRESENTATION

2.
Assign Priority and Urgency



3.
Identify Top Priority Actions



Small Team Exercise

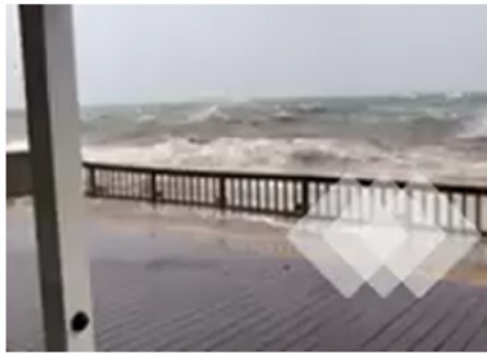
GETTING STARTED

- Identify Small Team Spokesperson
- Clarifying questions

EXERCISE

1. Identify Actions to Reduce Vulnerability or Reinforce Strengths
2. Assign Priority and Urgency of Each Action
   - Infrastructure
   - Societal
   - Environmental
3. Identify Top 5 Priority Actions

Break

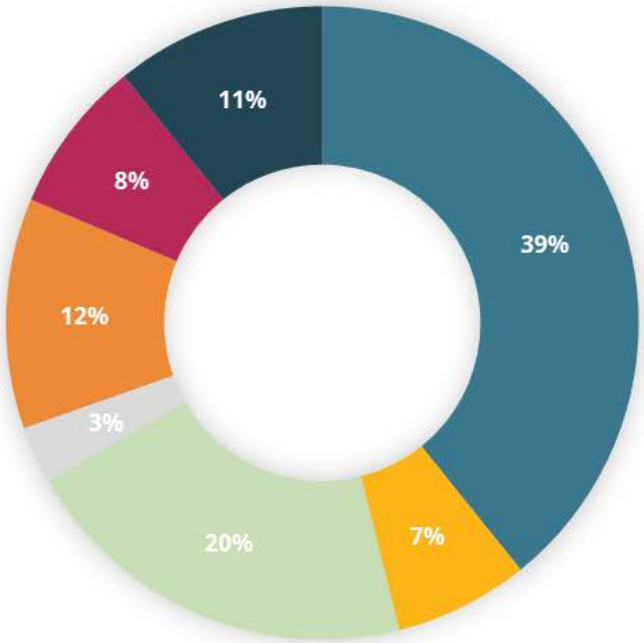


WORKSHOP PRESENTATION

WORKSHOP PRESENTATION

Please tell us about yourself

ONLINE SURVEY

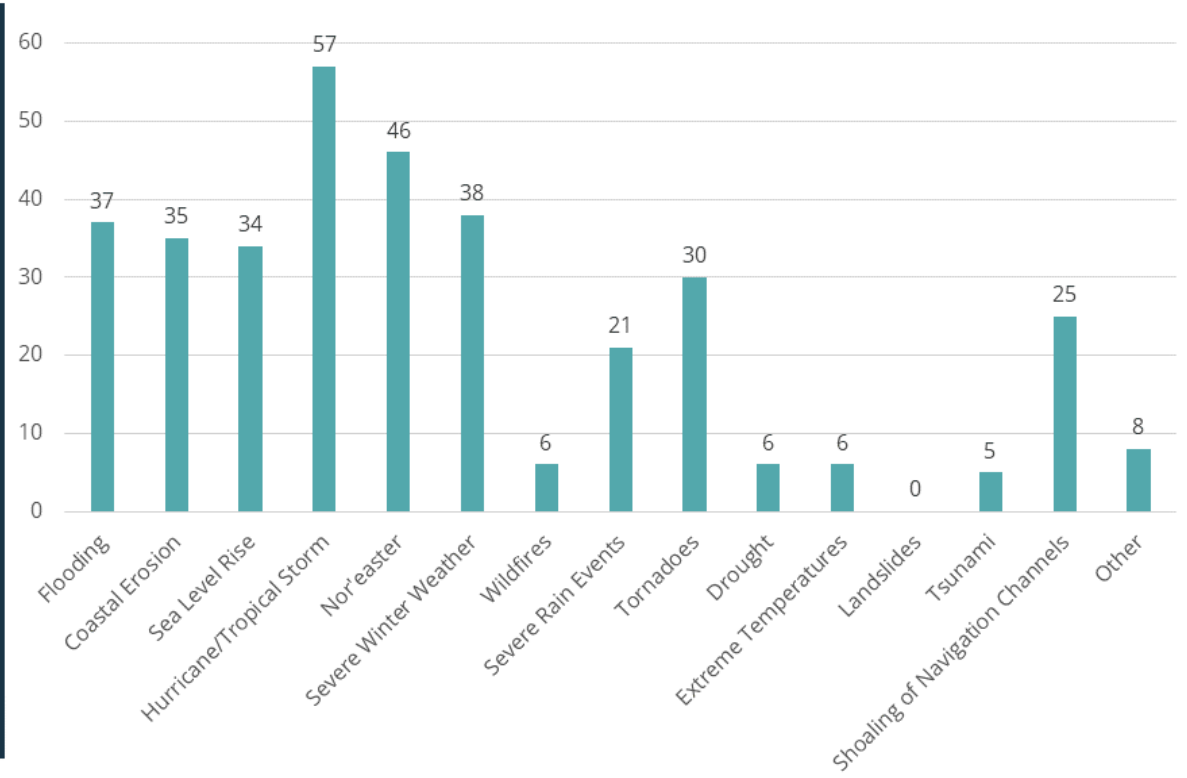


Other: Retail Store Manager | CCHC | Former Town of Yarmouth Water Superintendent, retired | Town Employee (3) | Victim of July tornado | School committee member | Municipal manager | ED of The Family Pantry of Cape Cod | Facilities manager with CC5

PRE-WORKSHOP SURVEY RESULTS

Which of the following hazards most concern you?

ONLINE SURVEY

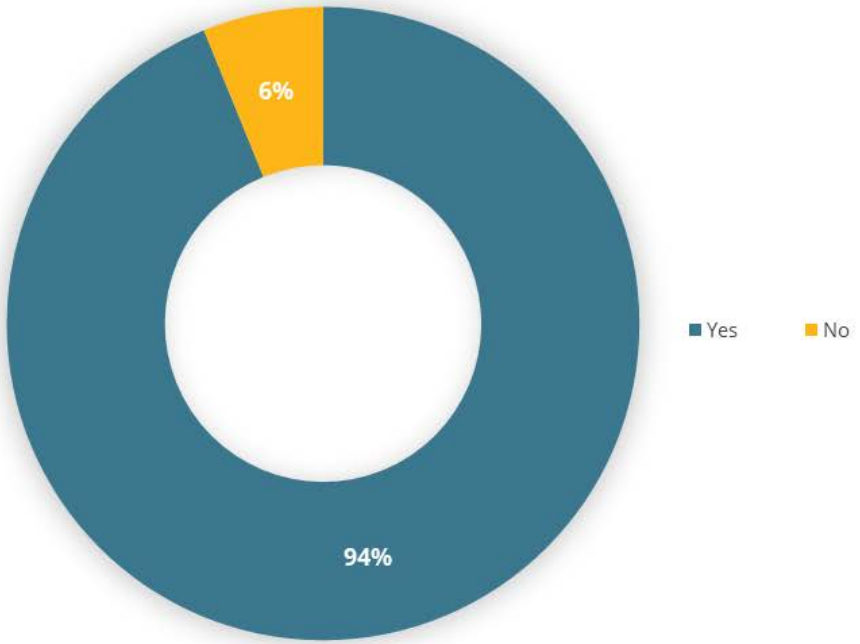


Other: High winds (2) | Nuclear threat from Pilgrim plant | Drinking water supply and quality (2) | Pollution of water (2) | lack of pollinators | High groundwater levels | Outbreak/infectious diseases

PRE-WORKSHOP SURVEY RESULTS

Have you experienced a weather related disaster while living, working or visiting Harwich?

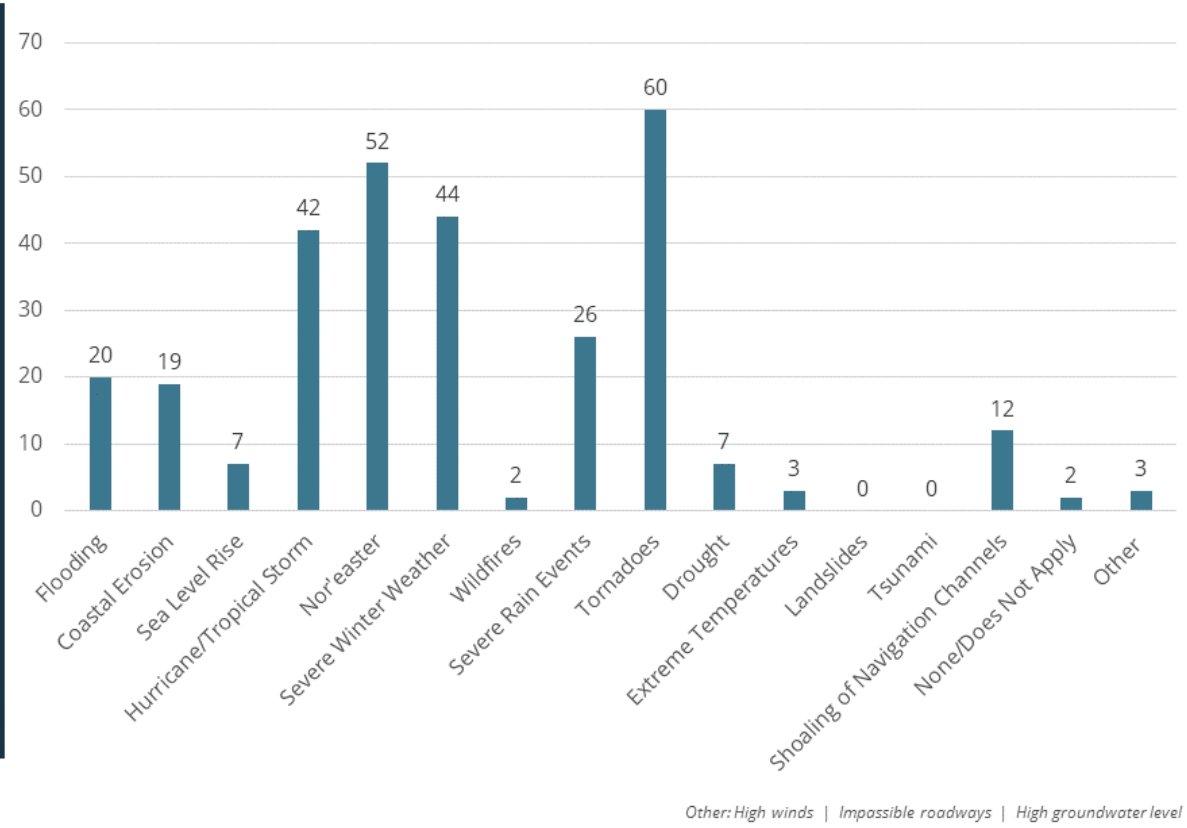
ONLINE SURVEY



PRE-WORKSHOP SURVEY RESULTS

Which of the following natural hazards have you experienced while in Harwich?

ONLINE SURVEY

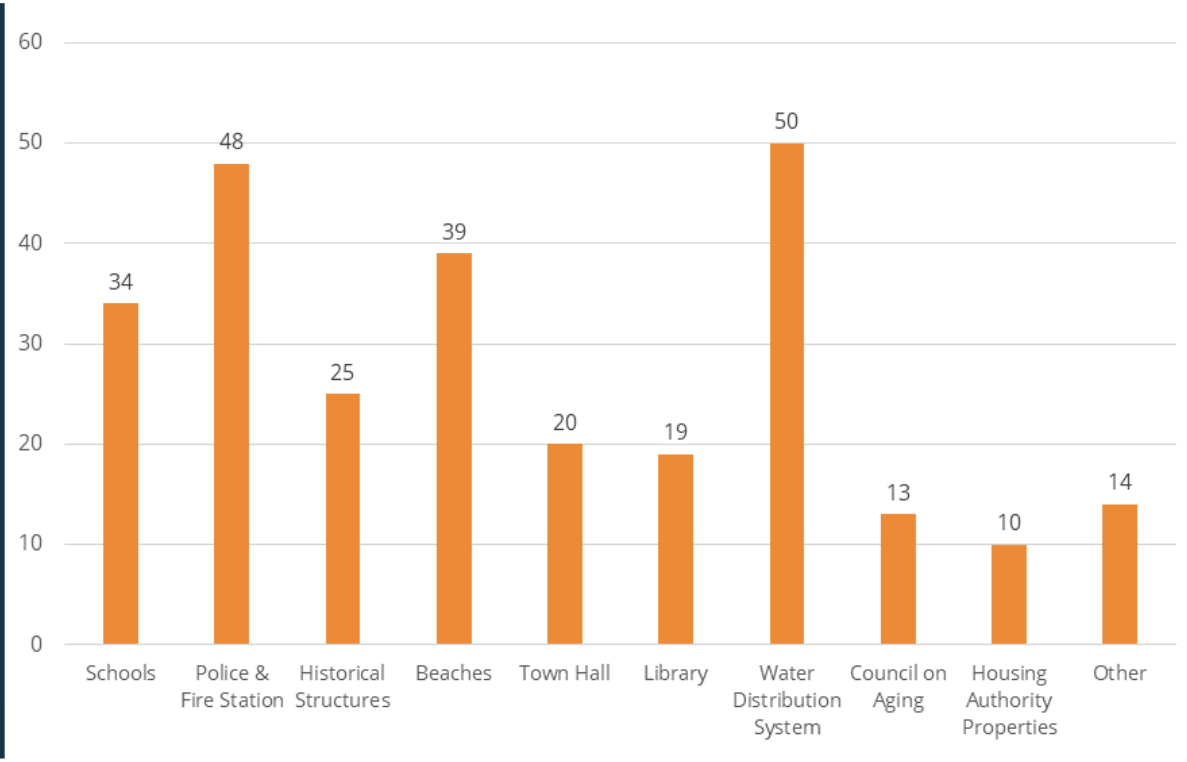


Other: High winds | Impassible roadways | High groundwater level

PRE-WORKSHOP SURVEY RESULTS

What specific public assets are you most concerned with protecting from the effects of natural hazards and climate change?

ONLINE SURVEY

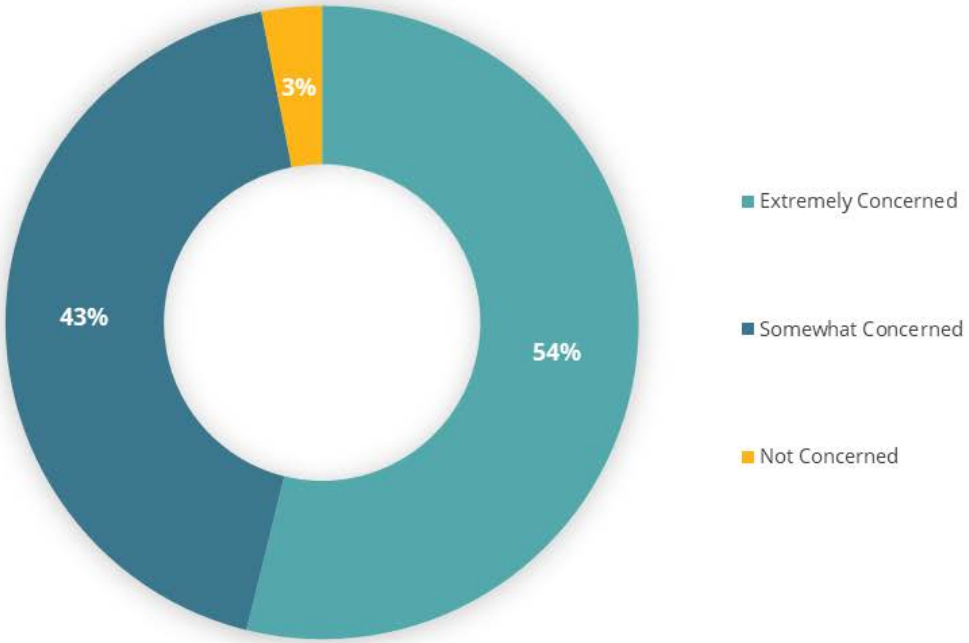


Other: Harbor facilities (4) | Hospital and medical services | Community Center, Rec Dept (2) | DPW (2) | Commercial fishing infrastructure | Cultural Center | Long-term elderly care facilities | Coastal roads | Public health (contaminated water, lack of water, spread of disease, etc.) | Septic and sewer systems | Roads

PRE-WORKSHOP SURVEY RESULTS

How concerned are you about the possibility of natural hazards or a changing climate impacting Harwich?

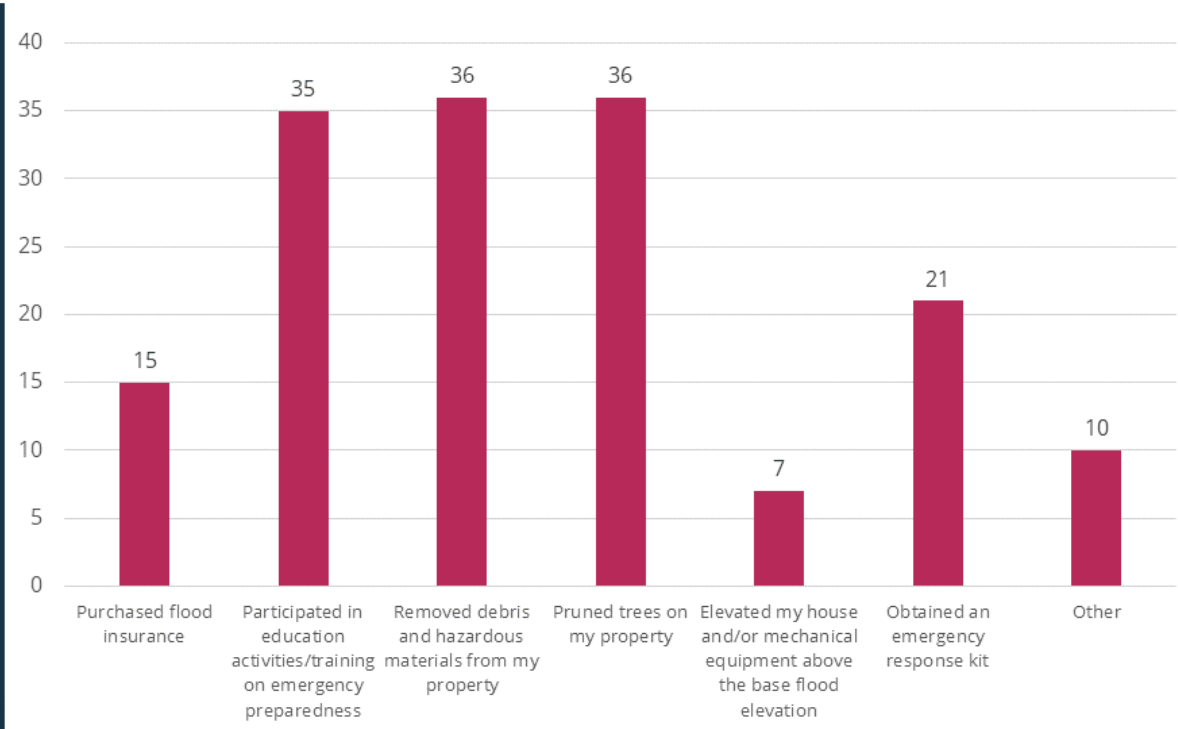
ONLINE SURVEY



PRE-WORKSHOP SURVEY RESULTS

Which of the following actions have you taken to protect you and/or your property from natural hazards and/or climate change?

ONLINE SURVEY

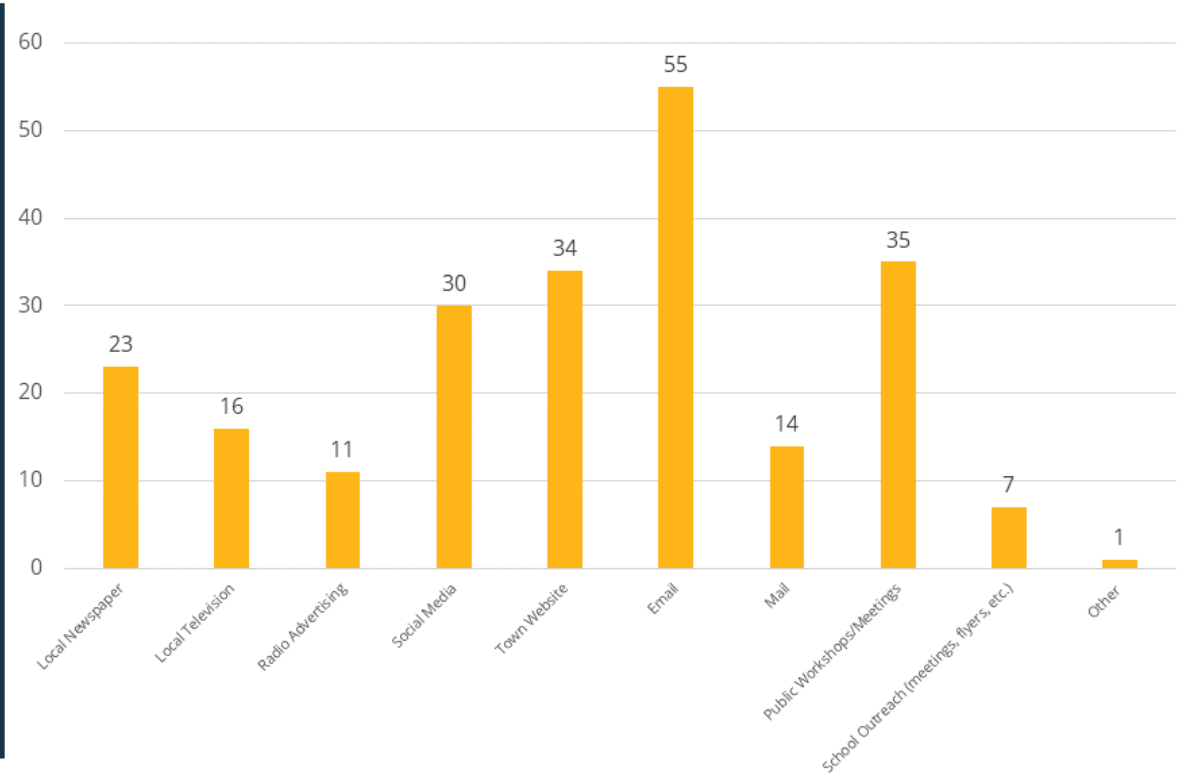


Other: None of the above or N/A (3) | Harbor infrastructure renovation projects completed that considered sea level rise | Prepared disaster plan; participated in disaster training to protect cultural and historic assets | Signed up for the alert system | Emergency food and water supply, emergency generator (2) | Limit use of natural resources, recycle, etc. | Built hurricane shutters stored in basement

PRE-WORKSHOP SURVEY RESULTS

What is the most effective way to engage you in resiliency planning activities?

ONLINE SURVEY

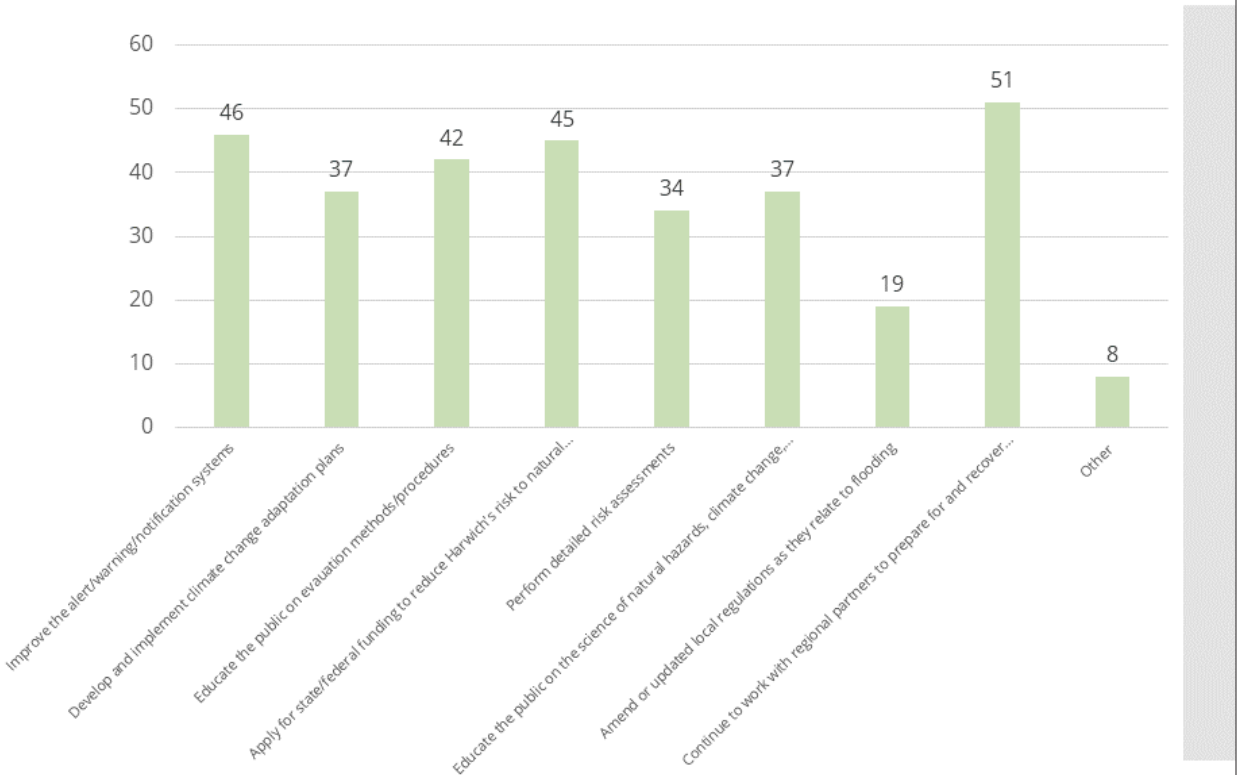


Other: Programs at library or school after work hours

PRE-WORKSHOP SURVEY RESULTS

What steps can the local government take to improve the resiliency of Harwich?

ONLINE SURVEY



PRE-WORKSHOP SURVEY RESULTS

What steps can the local government take to improve the resiliency of Harwich?

ONLINE SURVEY

OTHER RESPONSES

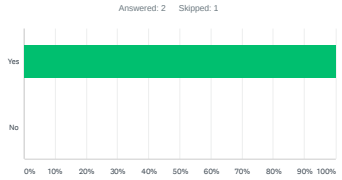
- Create, site specific, solar powered micro grids with battery storage capable of sustaining the water department, fire and police, town hall, emergency shelters
- Improve the electric grid, establish a better communication system for power outages along with an improved communication network to inform the public how clean-up and repair is being prioritized and completed.
- improve internal communications systems between town departments - there needs to be a way for different dept heads to talk to each other when the power is out and/or when no cell service etc.
- Continuing to develop and improve upon any disaster prep/recovery plans is vital so we are not just reacting to natural weather events after the fact, but putting the pieces in place to be prepared for them ahead of time.
- More than just improve emergency notification systems, which has been done, the town needs to use available methods to communicate with the public, giving accurate and comprehensive information, updated on a regular basis during a storm or event.
- 1) Financial assistance for homeowners to clean up storm debris 2) safety of visitors/tourists staying in rentals
- Require low cost upgrades to help when building or modifying building
- Allow seawalls

LISTENING SESSION COMMENT PERIOD WEBSITE

Harwich MVP Listening Session Survey

Q1 Do you believe climate change has or will have an impact on Harwich?

Answered: 2 Skipped: 1

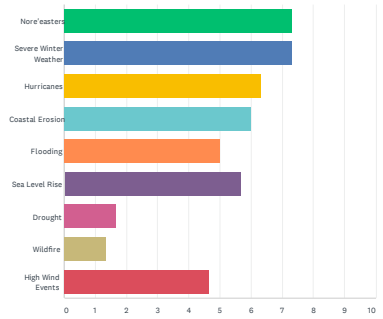


ANSWER CHOICES	RESPONSES	
Yes	100.00%	2
No	0.00%	0
TOTAL		2

Harwich MVP Listening Session Survey

Q2 Please rank the hazards that could impact Harwich in order of priority of concern (click and drag to reorder)

Answered: 3 Skipped: 0



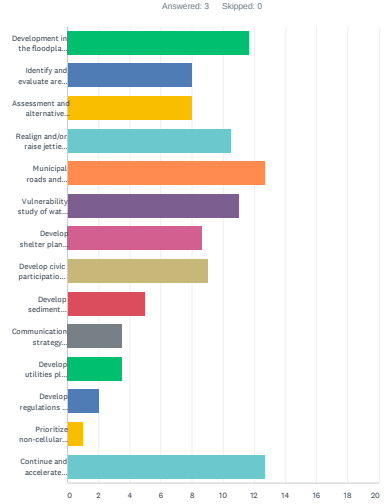
	1	2	3	4	5	6	7	8	9	TOTAL	SCORE
Nore'easters	33.33% 1	0.00% 0	33.33% 1	33.33% 1	0.00% 0	0.00% 0	0.00% 0	0.00% 0	0.00% 0	3	7.33
Severe Winter Weather	33.33% 1	33.33% 1	0.00% 0	0.00% 0	33.33% 1	0.00% 0	0.00% 0	0.00% 0	0.00% 0	3	7.33
Hurricanes	0.00% 0	0.00% 0	66.67% 2	0.00% 0	33.33% 1	0.00% 0	0.00% 0	0.00% 0	0.00% 0	3	6.33
Coastal Erosion	33.33% 1	0.00% 0	0.00% 0	0.00% 0	33.33% 1	33.33% 1	0.00% 0	0.00% 0	0.00% 0	3	6.00
Flooding	0.00% 0	0.00% 0	0.00% 0	50.00% 1	0.00% 0	50.00% 1	0.00% 0	0.00% 0	0.00% 0	2	5.00
Sea Level Rise	0.00% 0	33.33% 1	0.00% 0	33.33% 1	0.00% 0	0.00% 0	33.33% 1	0.00% 0	0.00% 0	3	5.67
Drought	0.00% 0	0.00% 0	0.00% 0	0.00% 0	0.00% 0	0.00% 0	0.00% 0	66.67% 2	33.33% 1	3	1.67
Wildfire	0.00% 0	0.00% 0	0.00% 0	0.00% 0	0.00% 0	0.00% 0	0.00% 0	33.33% 1	66.67% 2	3	1.33
High Wind Events	0.00% 0	33.33% 1	0.00% 0	0.00% 0	0.00% 0	0.00% 0	66.67% 2	0.00% 0	0.00% 0	3	4.67

LISTENING SESSION COMMENT PERIOD SURVEY RESULTS

Harwich MVP Listening Session Survey

Q3 Rank the following possible actions to address climate change impacts for Harwich in order of priority (click and drag to reorder)

Answered: 3 Skipped: 0



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Harwich MVP Listening Session Survey

	1	2	3	4	5	6	7	8	9	10	11	12	13
Development in the floodplain: Climate ready zoning and design guidelines (designing for the future in the floodplain)	33.33% 1	0.00% 0	33.33% 1	0.00% 0	0.00% 0	33.33% 1	0.00% 0	0.00% 0	0.00% 0	0.00% 0	0.00% 0	0.00% 0	0.00% 0
Identify and evaluate areas for marsh migration for land acquisition	0.00% 0	0.00% 0	0.00% 0	0.00% 0	50.00% 1	0.00% 0	0.00% 0	0.00% 0	50.00% 1	0.00% 0	0.00% 0	0.00% 0	0.00% 0
Assessment and alternative analysis to address Lothrop Avenue utilities including an above ground water main, electric substation, and underground cable for protection from high ground water caused by flooding and wind damage	0.00% 0	0.00% 0	0.00% 0	0.00% 0	0.00% 0	50.00% 1	0.00% 0	50.00% 1	0.00% 0	0.00% 0	0.00% 0	0.00% 0	0.00% 0
Realign and/or raise jetties on south shore to accommodate increased storm activity and sea level rise to protect beaches and barrier beaches that reduce inland flooding	0.00% 0	50.00% 1	0.00% 0	0.00% 0	0.00% 0	0.00% 0	50.00% 1	0.00% 0	0.00% 0	0.00% 0	0.00% 0	0.00% 0	0.00% 0
Municipal roads and culverts: Vulnerability assessment of low-lying roads and culverts and implementation of priorities from assessment	0.00% 0	66.67% 2	33.33% 1	0.00% 0	0.00% 0	0.00% 0	0.00% 0	0.00% 0	0.00% 0	0.00% 0	0.00% 0	0.00% 0	0.00% 0
Vulnerability study of water department well fields	0.00% 0	0.00% 0	0.00% 0	100.00% 2	0.00% 0	0.00% 0	0.00% 0	0.00% 0	0.00% 0	0.00% 0	0.00% 0	0.00% 0	0.00% 0
Develop shelter plan including identifying shelter location (s) and shelter in place including a town building assessment for new emergency shelter	0.00% 0	0.00% 0	0.00% 0	33.33% 1	0.00% 0	0.00% 0	33.33% 1	33.33% 1	0.00% 0	0.00% 0	0.00% 0	0.00% 0	0.00% 0
Develop civic participation or education plan for preparation and planning including through public/private partnerships	0.00% 0	0.00% 0	33.33% 1	0.00% 0	0.00% 0	33.33% 1	0.00% 0	0.00% 0	33.33% 1	0.00% 0	0.00% 0	0.00% 0	0.00% 0
Develop sediment management plan for beaches	0.00% 0	0.00% 0	0.00% 0	0.00% 0	0.00% 0	0.00% 0	0.00% 0	0.00% 0	0.00% 0	100.00% 2	0.00% 0	0.00% 0	0.00% 0
Communication strategy	0.00% 0	0.00% 0	0.00% 0	0.00% 0	0.00% 0	0.00% 0	0.00% 0	0.00% 0	0.00% 0	0.00% 0	50.00% 1	50.00% 1	0.00% 0

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LISTENING SESSION COMMENT PERIOD SURVEY RESULTS

Harwich MVP Listening Session Survey

including: businesses (healthcare, electricity, internet, food), residents, seasonal population, workforce, power access, town emergency operations, transportation, debris removal, tree management, shelters, and pets, reverse 911													
Develop utilities plan including tree trimming and undergrounding	0.00% 0	0.00% 0	0.00% 0	0.00% 0	0.00% 0	0.00% 0	0.00% 0	0.00% 0	0.00% 0	0.00% 0	50.00% 1	50.00% 1	0.00% 0
Develop regulations for land subject to coastal storm flowage (LSCSF)	0.00% 0	0.00% 0	0.00% 0	0.00% 0	0.00% 0	0.00% 0	0.00% 0	0.00% 0	0.00% 0	0.00% 0	0.00% 0	0.00% 0	100.00% 2
Prioritize non-cellular communications for town staff to strengthen communications during emergencies	0.00% 0	0.00% 0	0.00% 0	0.00% 0	0.00% 0	0.00% 0	0.00% 0	0.00% 0	0.00% 0	0.00% 0	0.00% 0	0.00% 0	0.00% 0
Continue and accelerate sewer expansion	66.67% 2	0.00% 0	0.00% 0	0.00% 0	33.33% 1	0.00% 0	0.00% 0	0.00% 0	0.00% 0	0.00% 0	0.00% 0	0.00% 0	0.00% 0

Harwich MVP Listening Session Survey

Q4 What do you think is the most important thing for Harwich to pursue to mitigate the impacts of climate change?

Answered: 3 Skipped: 0

#	RESPONSES	DATE
1	Sewer	5/14/2020 2:21 PM
2	improve storm drainage and culverts elevate low lying roads make sure infrastructure such as power lines & water utilities are above high mean water levels	5/11/2020 9:22 PM
3	Make sure we identify the floodplain	5/11/2020 10:41 AM

LISTENING SESSION COMMENT PERIOD SURVEY RESULTS

Harwich MVP Listening Session Survey

Q5 Other comments

Answered: 1 Skipped: 2

#	RESPONSES	DATE
1	This was very well done.	5/11/2020 10:41 AM

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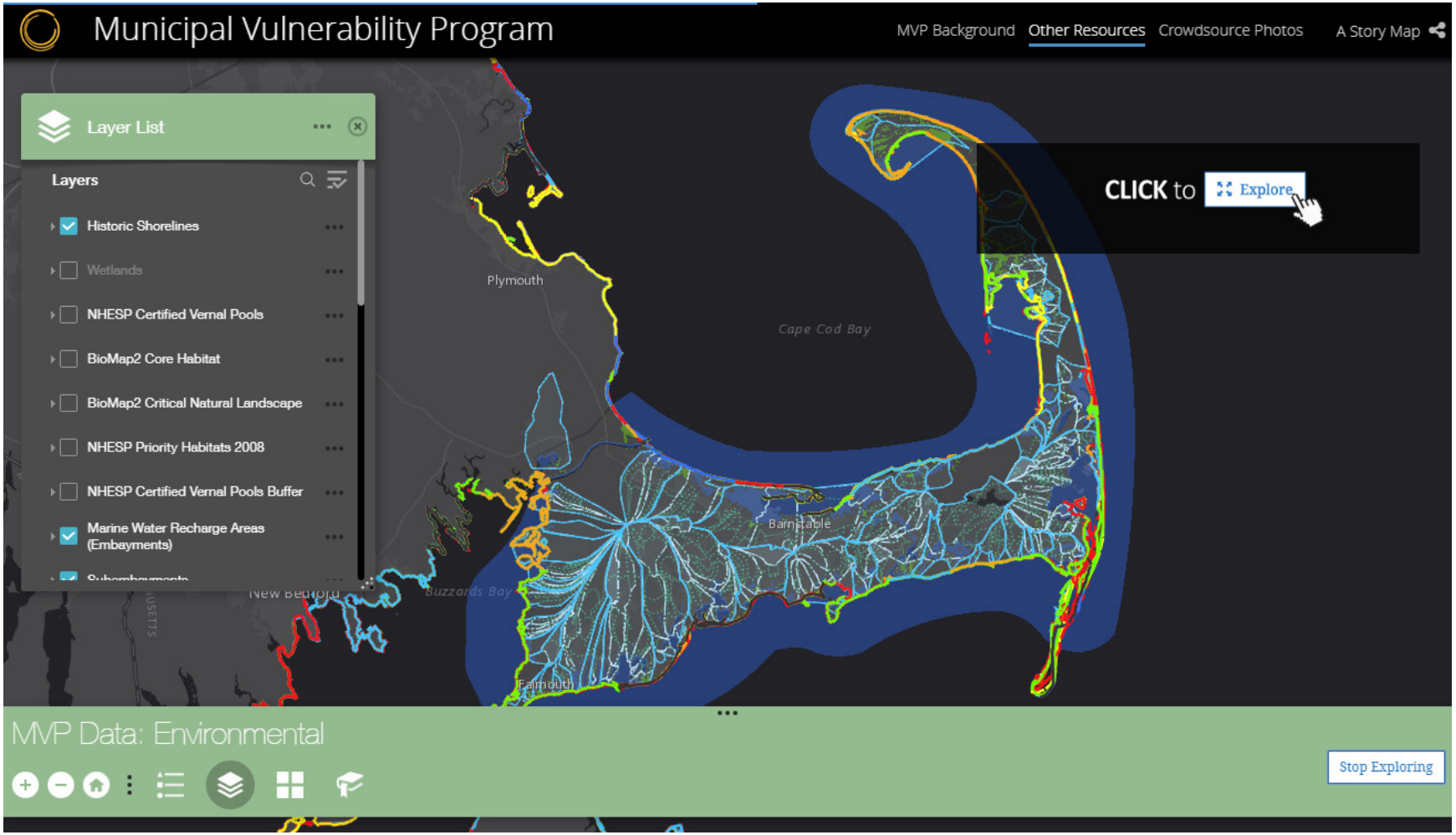
LISTENING SESSION COMMENT PERIOD SURVEY RESULTS



MVP STORYMAP (available at https://arcg.is/1CX4K9)

HARWICH COMMUNITY RESILIENCE BUILDING WORKSHOP
SUMMARY OF FINDINGS

PREPARED BY THE CAPE COD COMMISSION & CAPE COD COOPERATIVE EXTENSION

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CAPE COD COMMISSION