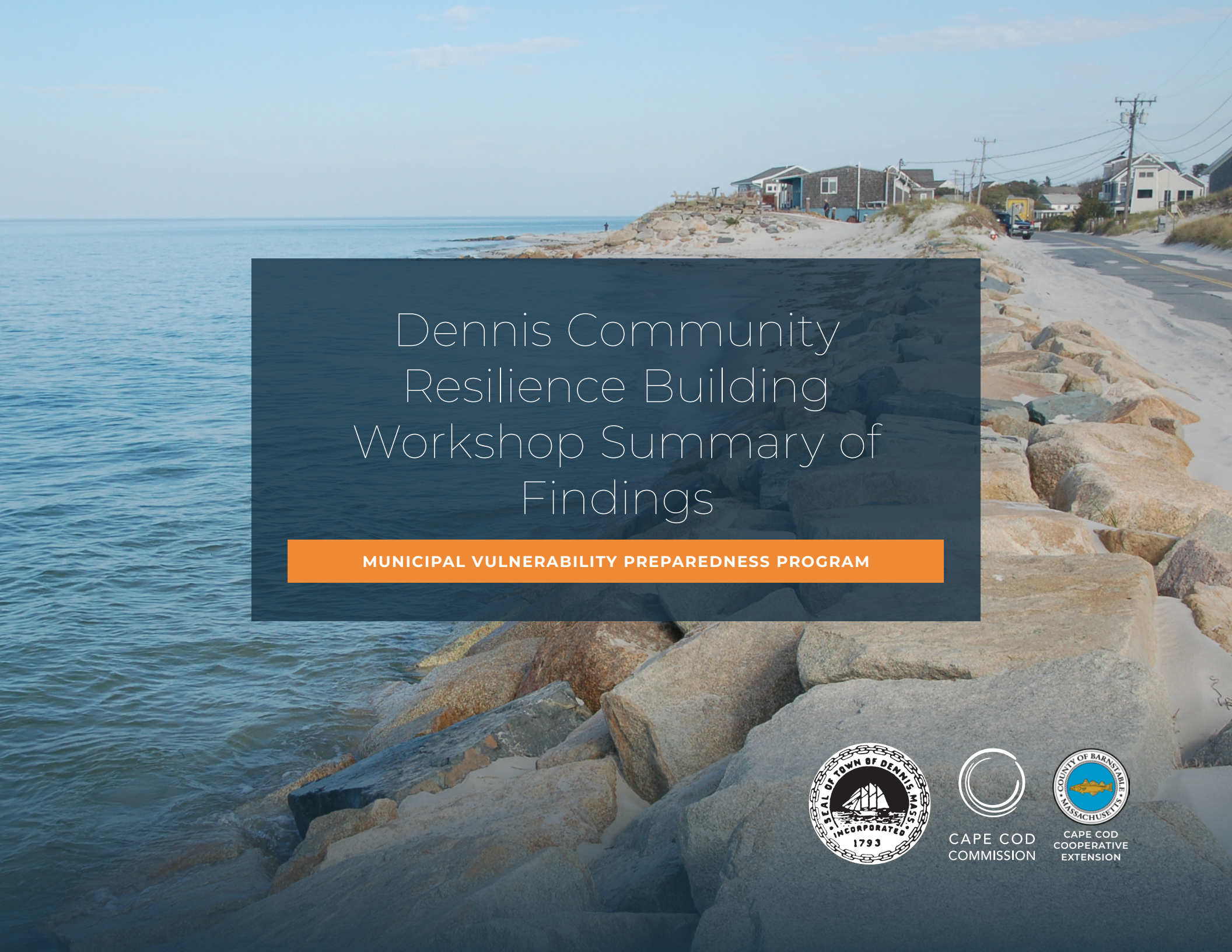

Dennis Community Resilience Building Workshop Summary of Findings

MUNICIPAL VULNERABILITY PREPAREDNESS PROGRAM

CAPE COD COMMISSION

CAPE COD COOPERATIVE EXTENSION

ACKNOWLEDGEMENTS

Special thanks to the Town of Dennis for embracing this process and providing the facilities and refreshments for the workshop, and to the participants for their invaluable input about the community.

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 Overview

The need for municipalities, regional planning organizations, states, and federal agencies to plan for increased resilience and adaptation to extreme weather events and climate changes is evident, particularly in coastal communities. Cape Cod has already begun to experience the effects of changing climate conditions and associated natural hazards, including sea level rise and extreme weather events. 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. This resulted in the Massachusetts Municipal Vulnerability Preparedness (MVP) program, which provides communities with funding to identify vulnerabilities and develop plans to specifically increase resilience to climate change.

The Town of Dennis recognized that it has the potential to be impacted by climate change and a wide range of natural hazards, presenting certain risks to life and property in the town. With 63 miles of shoreline and natural resource areas, Dennis is at risk of increased flooding due to rising sea levels, more intense coastal storms, and increased coastal erosion, which could impact its seasonal economy. Together with flooding, Dennis' future will likely include more frequent heat waves and droughts, which could increase the risk of wildfires. These risks threaten not only Dennis' economy and natural landscapes and resources, but also the people who live and visit Dennis and the infrastructure they rely on.

The Town of Dennis is home to scenic historic villages and business districts. With a year-round population of about 14,000 people that swells in the summertime, the Town also has large areas of suburban residential and commercial development. Dennis is known for its numerous beaches that lie on Nantucket Sound to the south and Cape Cod Bay to the north, which are key attractions for residents and visitors alike.

Dennis is a popular summer resort and tourism is one of the primary sources of economic activity. While changes in the seasons due to climate change, such as a longer summer season and warmer winters, may serve to lengthen Dennis' tourist season and provide the potential for greater economic activity, the potential negative impacts of climate change on the town's beaches, marshes, and other natural and recreational assets may outweigh any benefits of an extended tourist season. In addition, tourist infrastructure in flood-prone areas, such as roadways and parking lots along the coast, is vulnerable to sea level rise and coastal storms. Further, the town's tax base could be negatively impacted as thousands of Dennis' homes and properties are located in areas at risk from flooding and sea level rise. This includes some of the most expensive properties in town, but also within the flood zone in Dennis is an Environmental Justice Area.

The Town is committed to taking a comprehensive approach to its planning efforts. With a $20,000 grant from the Massachusetts Executive Office of Energy and Environmental Affairs MVP Program, the Town of Dennis contracted with certified MVP providers from the Cape Cod Commission and Woods Hole Sea Grant & Cape Cod Cooperative Extension (the "project team") to conduct the Community Resilience Building workshop, key to becoming an MVP designated community.

With the Town Planner Daniel J. Fortier as the lead, the Town established a Core Team of town staff to help prepare for and conduct the workshop. In addition to the Town Planner, the Core Team included representatives from Police, Fire, Department of Health, Department of Public Works, the Conservation Program, the Department of Natural Resources, and Administration among others. For a complete list of Dennis Core Team members, See Project Team Members on page 17. The Project Team held a kickoff meeting with the Core Team in September 2019 to review the project scope, discuss ways to engage stakeholders to participate, and begin preparations for the workshop. This early meeting with the Core Team helped to identify a broad range of interests and provided an opportunity to brainstorm potential stakeholders to invite to the workshop. The group discussed ways to engage participants, including a webpage and email invitations to town boards and others. This meeting was also used to discuss background materials needed for the workshop such as the basemaps and PowerPoint presentation.

Following the first meeting, the project team worked on developing drafts of workshop materials and assisting the Core Team with outreach to stakeholders. Members of the Core Team and Project Team met again in November to discuss the draft workshop materials, identify any needed refinements, and to go over workshop logistics. At this meeting, the Core and Project Team reviewed a draft presentation for the workshop that would help educate stakeholders about the

purpose of the MVP planning effort, provide resource data, maps, and information on climate change and other hazards facing the town, and to help prepare workshop attendees for the small group breakouts. The group discussed refinements to the presentation including providing some additional data on hazards.

Several weeks before the workshop the Town sought community and stakeholder participation through invitations to local board and committee members. 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 for those who were interested. The website also provided a link to the Cape Cod Commission storymap to help prepare and inform community members about hazards prior to the workshop. The workshop was also publicized through a variety of channels, including a post on the Town's planning blog, social media, and coverage in local news outlets.

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 response 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 workshop was held on November 15, 2019, in one eight-hour session and conducted in accordance with Community Resilience Building (CRB) guidance.[1] In addition to the Project Team members, approximately 34 stakeholders participated in the workshops, including Town department staff, Town board and committee members, public safety officials, residents, and local business owners.

This report provides a summary of the concerns, ideas, and priorities shared by these participants during Dennis' CRB workshop. The summary of findings described in this report, including those that concern the evolving nature of risk assessment and associated action, are compiled from comments, discussion, and brainstorming from workshop participants and Core Team members.

1 Community Resilience Building guidance: www.communityresiliencebuilding.org

Hazards, Concerns, and Strengths

TOP HAZARDS, COMMUNITY STRENGTHS, AND VULNERABLE ASSETS

The morning session of the workshop focused on identifying top hazards, vulnerabilities, and strengths. The day began with a presentation providing an overview of the MVP program and the workshop's goals before delving into the hazards facing Dennis. Greg Berman, Coastal Processes Specialist with the Woods Hole Sea Grant & Cape Cod Cooperative Extension, gave a PowerPoint presentation on the top vulnerabilities and hazards identified by the State, regional vulnerabilities and hazards, and climate change projections in Massachusetts with data from the Climate Change Clearing House for the Commonwealth (www.resilientma.org) (see Appendix for the presentation). During the morning portion of the workshop, participants learned about and discussed locally relevant climate hazards including, but not limited to:

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

Workshop participants divided into four groups (A, B, C, and D) and were joined by a project team member, acting as facilitator, and a Cape Cod Commission staff member acting as a scribe. Basemaps with critical town information such as infrastructure, floodplains, conservation land, evacuation routes, and critical facilities were placed at each table (see Appendix) and computers with the online storymap and Climate Change Clearinghouse were also available for stakeholders to use. The combination of the risk matrix and basemaps provided decision support and risk visualization to enable

stakeholders to identify the community's top hazards and strengths and vulnerabilities. During the morning, each table worked on its own risk matrix through facilitated "small team" exercises, coming together later in the morning to hear from one another.

TOP HAZARDS

Using the basemaps and storymap resources as a guide, each small team engaged in a facilitated discussion to identify what it considered to be the four hazards that pose the greatest current and future threats to Dennis. To help each group determine the priority hazards, facilitators asked participants to consider where, how often, and in what ways hazards have impacted the community; what hazards are impacting the community currently; what effects these hazards will have in the future; what is exposed to hazards and climate threats; what have been the impacts to municipal operations and budgets, planning and mitigation efforts; and other concerns/considerations related to impacts.

Workshop participants identified the following as the top priority hazards through their small groups:

- Flooding/Sea level rise
- Severe weather/Storms (including wind, nor'easters, hurricanes)
- Erosion
- Drought/Wildfire

Flooding and Sea Level Rise were identified as having a significant direct impact on the Town of Dennis both currently and in the recent past, particularly the impact of flooding on regional and local roadways. The groups identified Routes 6A and 28, Dr. Bottero Road, New Boston Road, South Street, Lighthouse Street, and south-side low-lying areas as being particularly vulnerable. The groups also noted the large number of homes and businesses located within the floodplain and SLOSH zones, including an Environmental Justice area, as well as culverts, marshes, harbors (Sesuit and Bass River), and other infrastructure such as septic systems and key bridges in town (Lower County Road, Dennis Port bridges) vulnerable to storm-related and sea level rise flooding.

Storms and severe weather such as nor'easters and hurricanes were also identified as a major concern for the community as these events result in power outages and downed tree limbs, which can impede access to residents and businesses, and place a strain on public safety resources and personnel.

Coastal erosion was another priority hazard as it impacts beaches, parking lots that serve these beaches, and numerous private properties. Maintaining access to local beaches presents natural resource concerns and is an economic priority for the community.

Drought and wildfire risk were also identified as a threat in areas of town where there are large woodlands or open meadows with tinder build-up and proximate to densely populated areas.

AREAS OF CONCERN

Following the discussion of hazards, each small team identified infrastructural, societal, and environmental community vulnerabilities and strengths, including town, state, and private assets. While specific locations and features were identified during the workshop, they can more broadly be grouped into the following categories.

Roadways, Bridges, and Culverts

There are many low-lying roads in the town that presently flood during storm events; bridges and culverts that are undersized and flood; access to several neighborhoods including senior housing may be affected by flooding; and evacuation routes may be impassable during flood/storm events.

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.

Other Infrastructure

Above-ground electrical and other utilities, including telecommunications, are vulnerable to damage and outages from storms or high winds; septic systems are vulnerable during flooding; stormwater systems may be inadequate/undersized for current and future storm events.

Social

Homes and septic systems, and some private wells are located within the floodplain and may be vulnerable to flooding and erosion; vulnerable populations, including seniors, and Environmental Justice communities are also located within the floodplain and may be vulnerable to risks from storms and flooding/sea level rise; some areas may become isolated with sea level rise and flooding; elderly and vulnerable populations may be unable to access medical care during storm and flooding events.

Natural Systems and Open Spaces

Salt marshes can provide floodwater storage but are also vulnerable areas; sediment supply and management, including ensuring adequate navigation channels, may be vulnerable to erosion and changes in the coastline; the water quality of both salt and fresh water bodies, including ponds and drinking water is potentially at risk from flooding and sea level rise impacts to infrastructure and a lack of adequate stormwater infrastructure; displacement or development of wildlife habitat and corridors may increase risks from storms and flooding; fire management is needed for several open spaces in town which may become susceptible to wildfire with drought; invasive species and algal blooms need to be managed; changes in climate could lead to increased insects and pests.

CURRENT CONCERNS AND CHALLENGES PRESENTED BY HAZARDS AND CLIMATE CHANGE

The Nantucket Sound shoreline is very vulnerable to tropical storms, which are relatively low frequency but can be highly destructive. Additionally, as little as three feet of sea level rise may permanently inundate sections of this shoreline (for example, West Dennis Beach and Sea Street Beach). The Cape Cod Bay shoreline experiences a much larger tide range and the relatively frequent winter storms are eroding coastal landforms across this area (for example Chapin Beach and Corporation Beach). Coastal bank erosion has permanently removed sections of upland property; at the same time, this erosion has provided the material for dune and beach recovery.

Flooding of the Cape Cod Bay shoreline occurred during the winter storms of 2018. The winter storm of January 4th and 5th, 2018 is the new record-breaking water level (Boston Tide Gauge), having exceeded the previous record (Winter storm of 1978) by 2 inches. The tide gauge record shows about 4.5 inches of sea level rise during the time between these two storms, meaning that the reason 2018 was a record-breaking event was due to sea level rise. Another anomaly was the series of winter storms in early March 2018. The storm surge was 1-2 feet for over a week, which weakened many coastal resource areas and resulted in significant erosion. There are concerns that both long-duration and high water-level storms will be the "new normal."

Primary climate and natural hazards identified by the participants included sea level rise, flooding, storms, and drought. Dennis has been impacted by Nor'easters for decades, but in recent years storm frequency and intensity have increased. In addition to Nor'easters, several participants noted concern about hurricanes, which can have different impacts than a nor'easter. Participants identified areas where flooding already impacts local roadways, and expressed concern about anticipated flooding along Routes 6A and 28, significant east/west routes. Participants also expressed concern about storms resulting in downed utility lines, downed communication lines, and downed trees and limbs across roadways hampering access/egress and communication during storm events. Erosion was also a concern, though there were fewer specific examples of erosion impacts than there were of flooding. Looking forward, participants also recognized that sea level rise may only exacerbate flooding and other impacts in areas throughout town. Participants also noted that with changes in climate that could result in more drought, the chance for wildfire could increase, especially in some identified conservation and open space areas throughout town which are bordered by neighborhoods.

SPECIFIC CATEGORIES OF CONCERNS AND CHALLENGES

Low-Lying Infrastructure

There are many low-lying roads in town (many noted on the maps, see Appendix), including portions of Route 6A, Route 28, South Street, Bridge Street, New Boston Road, Dr. Bottero Road, and Lower County Road. Undersized culverts and bridges associated with these roads and at other locations are also vulnerabilities. The group noted that the south side of town including the Environmental Justice community is particularly vulnerable to flooding.

Emergency Access and Isolation

All of the small discussion groups identified several populations under threat from the top hazards, including many neighborhoods that either currently experience flooding or are likely to in the future making access to/from these communities challenging. The entire Environmental Justice community in the south side of town was identified as very vulnerable to flooding, as were the Fingers on the south side, Dennis Port, and some areas near Sesuit Creek (on the north side of town).

As with all Cape Cod communities, Dennis has a significant senior population. Forest Hills, Forest Pines, and Antonelli Circle were identified as areas where many residents are older and may need assistance during flooding or intense weather events as they may have difficulty moving around during these events and may be confined to a home with limited food, water, medical supplies, and heating and cooling.

Seasonal residents and visitors were also identified as vulnerable as they may not receive the same emergency preparedness communications as year-round residents and are less likely to be prepared or understand how to best respond. It was also identified that there is a lack of organized neighborhood networking/groups, the presence of which may help in dealing with storm or flooding events.

Threats to the Environment

Septic systems and stormwater systems could be vulnerable to flooding, either fresh or salt, and could fail, contributing to the nitrogen loading challenges in the bays and estuaries that the town already faces. The coastal resource areas on the north and south sides of town can mitigate the impacts of storms and flooding but are also vulnerable to the effects of severe weather, erosion, and sea level rise. Participants identified erosion of beaches as a significant concern as well as a need for sediment supply management. Additionally, while salt marshes can mitigate flooding and sea level rise, they were identified as currently vulnerable, with a need to allow them to migrate with sea level rise. Participants were also concerned about impacts to town beaches including West Dennis, Corporation, and Chapin beaches. Wildfire risk elevated due to buildup of fuel loads in Dennis' woodlands and marshes, and the potential for greater drought in the future, was a concern both for the environment and the people living in neighborhoods nearby.

Telecommunications/Utilities

Most of Dennis is served by above ground utilities, which can become incapacitated during and following storm events. Without power, residents may lose access to heat, food may spoil, and without telecommunications, it can be difficult to know if a household is okay or in need of help. Especially with vulnerable and elderly populations that may be more likely to need assistance, maintaining communications and contact can be vital. Recent storms have highlighted the fragility of both the power supply and delivery infrastructure, as well as telecommunications.

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. Some of the strengths were also considered to be vulnerable as well.

Emergency Services

Dennis' emergency responders, communications, and shelters were identified as strengths of the community. The Town operates a CodeRED 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. Additionally, the location of the police and fire stations within town were identified as strengths.

Natural Assets

The natural environment, including town beaches, waterways, ponds, and conservation areas are a significant draw to residents and visitors in Dennis 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 and Conservation Trust staff, and funding for conservation were also noted as strengths.

Resilient Infrastructure

Participants noted some infrastructure as strengths for Dennis. This included harbors; the Bridge Street culvert, which allows marsh migration; Dr. Bottero Road, which while vulnerable, is also an asset to the community and will be more resilient when planned work is implemented; coastal engineering structures such as jetties; and tight tanks for septic systems in vulnerable areas.

Recommendations and Next Steps

TOP RECOMMENDATIONS TO IMPROVE RESILIENCE

The afternoon portion of the workshop focused on participants working in their small groups to develop actions that would help mitigate the town's vulnerabilities and capitalize on its strengths to help make Dennis more resilient to the top hazards identified that morning. 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 Dennis.

The top recommendations reported out of the four small groups included the following:

1. Conduct assessment of bridge conditions relative to vulnerability
2. Strengthen conservation commission regulations
3. Expand and implement town-wide dredging plan
4. Review regulations on development/ redevelopment in the floodplain
5. Community safety including evaluation of shelters and communications adequacy

6. Develop public education plan for evacuation
7. Communication, education, and outreach for shelter in place and marina management (fridge magnets)
8. Assessment of vulnerable roadways: prioritize, design, and implement (combined with #9)
9. Low lying road assessment (combined with #8)
10. Barrier beach protection through renourishment
11. Assessment and prioritization of stormwater infrastructure
12. Study, evaluate, and implement strategies for culverts town-wide
13. Stormtide pathways analysis for the south side (combined with #14)
14. Floodway on south side ID: ID the most critical paths to protect against flooding (combined with #13)
15. Take appropriate action from Dr. Bottero Road report (combined with #16)
16. Dr. Bottero Road Critical Case: Continue with the ongoing study and design and proceed with implementing recommended action. Best case: long term success; worst case: discover any shortcomings to improve resiliency. (combined with #15)
17. Fire management plan
18. Conservation land funding: statement of support from Town of Dennis to maintain or increase funding and purchase of land supporting climate concerns, e.g., marsh, drainage areas
19. Powerlines/telecommunications vegetation assessment and management utilizing drone technology (quick to evaluate issue locations to increase potential public safety during storm events) (combined with #20)
20. Red tape reduction study: Streamline permitting to minimize recovery timeline (combined with #19)

Each small group presented their top priority actions to the large group and the large group combined similar actions and then voted through a dot exercise to identify the most important actions for Dennis to improve its resiliency to climate change and the identified top hazards. The following actions represent the top recommendations of the large group, organized by priority.

1. Assessment and prioritization of stormwater infrastructure

Several groups identified the existing stormwater infrastructure as vulnerable and/or inadequate. Given the potential increase in frequency and intensity of precipitation events in the future, the large group agreed it was important to conduct an assessment of Dennis' stormwater infrastructure and identify and prioritize needs to improve its function and resiliency.

2. Stormtide pathways analysis for the south side

Given the extensive amount of development vulnerable to flooding on the south side of town (the north side of Town is also vulnerable but is already being analyzed through a grant), two of the four groups identified analyzing flooding on the south side as a top priority and the larger group agreed. A stormtide pathways or flooding analysis will identify points of entry for flooding for the south side of town. These are low-lying locations determined by GIS analysis and fieldwork to be the path of least resistance for the flow of elevated water levels associated with coastal storm flooding into developed and vulnerable areas. Conducting this analysis will help identify key locations for resiliency projects.

3. Community safety including evaluation of shelters and communications adequacy

Three of the four groups identified current emergency response times, shelters, and communications as strengths, and these are assets that can be reinforced. 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.

4. Assessment of vulnerable roadways: prioritize, design, and implement

Low-lying roadways was a common concern among all of the groups. Roadways are key to evacuating people, providing access for emergency responders, as well as for everyday travel and services. With several key roadways in Dennis 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. The assessment would prioritize the most vulnerable roads and identify strategies to improve their resiliency, paving the way for project design and implementation.

5. Conservation land funding

The final top priority identified by the large group was conservation land funding. The existing conservation land in town was generally identified as a strength but more conservation land would help Dennis in mitigating the impacts of climate change. More conservation land that would, for example, allow for salt marsh migration, create larger natural floodwater storage areas, and ensure development does not occur in vulnerable areas, would improve the town's resilience to flooding and sea level rise.

CONCLUSION AND NEXT STEPS

Following the workshop, the Town of Dennis continued the MVP certification process by distributing this report to the public via the town website, along with a video overview of the MVP workshop process and outcomes and a survey to gather further feedback. This was done in lieu of a public listening session meeting due to the COVID-19 pandemic. This

provided an opportunity for any member of the interested public to learn about the MVP process and provide feedback about the MVP workshop and recommended highest priority actions resulting from the workshop.

Seven people responded to the survey. Survey respondents could rank their top priority hazards and top priority actions. Top priority hazards generally aligned with those of the workshop participants. Top priority actions of survey respondents differed somewhat from the workshop participants, however given the small number of survey respondents, this did not result in a change to the list of the overall top priority actions the Town will pursue. Full survey responses and feedback are available in the appendix.

The top priorities from this process will be integrated into existing local planning efforts. The Town will consider pursuing grant funding to implement the priority actions as appropriate to continue to improve the Town's resilience to climate change.

CRB WORKSHOP PARTICIPANTS

- Diane Ota
- Karen Johnson
- Kevin Brock
- Katherine Garofoli
- Tom Andrade
- Chris Clark
- Bob Brown
- Bill Norman
- Elizabeth Sullivan
- Mark Burgess
- Shannon Hulst
- Kristen Keller
- Julie Kennie
- Steve Kennie
- William "Joe" Greer
- Dustin Pineau
- Alicia Messier
- Gail Hart
- Kate Byron
- Paula Bacon
- David Cross
- Dan Fortier
- Jeff Traker
- John Emerson
- John Simpson
- John Brady
- George Levesque
- Grethe Kaeselau
- Wayne Bergeron
- Bob Kelly
- Sue Brock
- Bob Perry
- Bill Saviki
- Agnes Chatelain
- Courtney Rocha (Regional MVP Coordinator)

CRB CORE TEAM

PROJECT COORDINATOR FOR THE TOWN

Daniel J. Fortier, Town Planner

CORE TEAM MEMBERS

- Elizabeth Sullivan, Town Administrator
- Thomas Andrade, Town Engineer
- Lieutenant Peter Benson, Dennis Police Department
- Lieutenant John Brady, Dennis Police Department
- Robert Brown, Deputy Chief, Dennis Fire Department
- Sergeant John Emerson, Dennis Police Department
- Sergeant Kenneth Gelnett, Dennis Police Department
- David S. Johansen, Director of Public Works
- Karen Johnson, Director of Natural Resources
- Kristen Keller, Health Director
- Alicia Messier, GIS Support Specialist
- Gerrit Murphy, Recreation Coordinator
- Dustin Pineau, Beach and Recreation Director
- Greg Rounseville, Assistant Town Administrator
- Brenda Vazquez, Director, Council on Aging

CRB PROJECT TEAM (MVP PROVIDER)

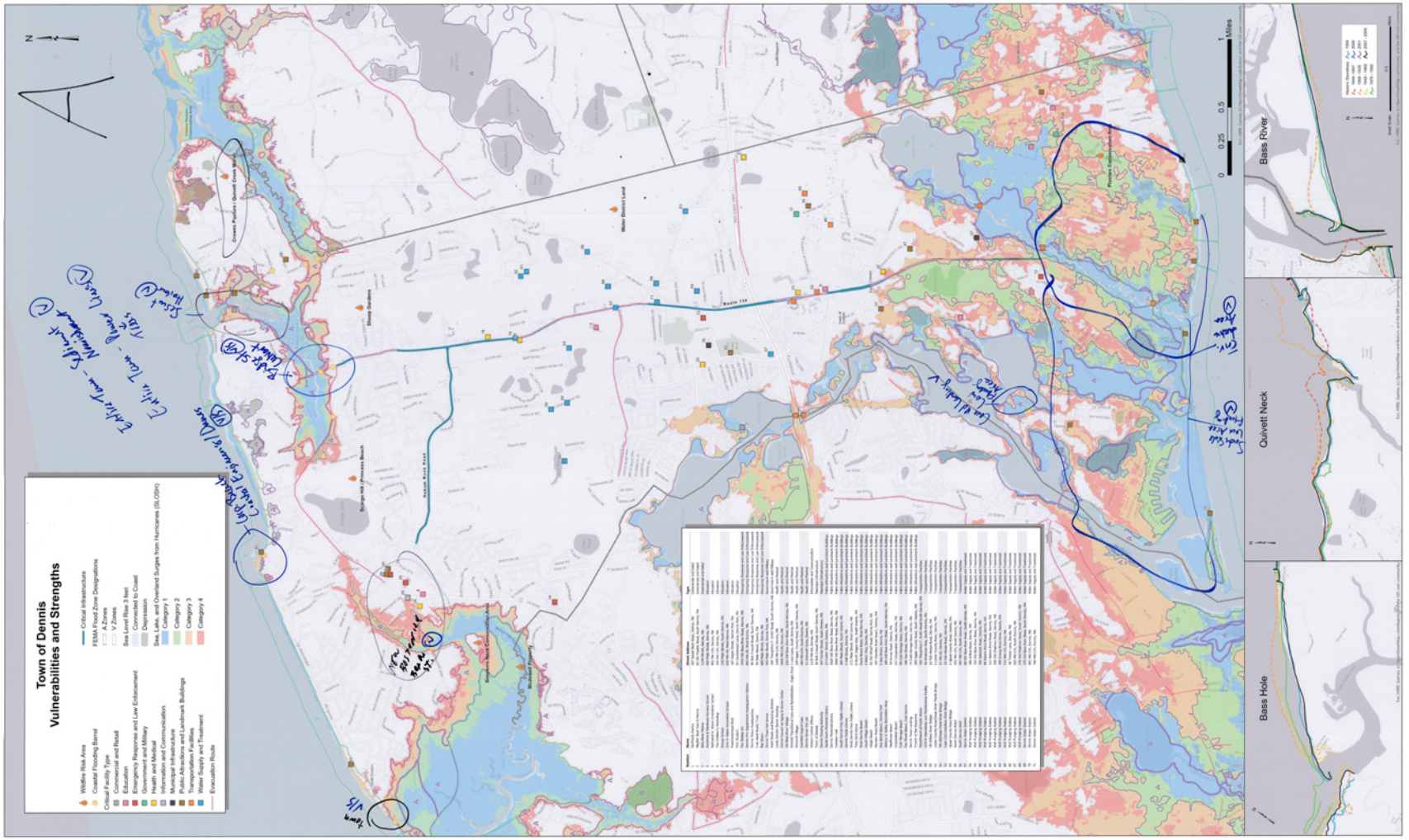
Cape Cod Commission

- 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
- Michele White, Special Projects Coordinator

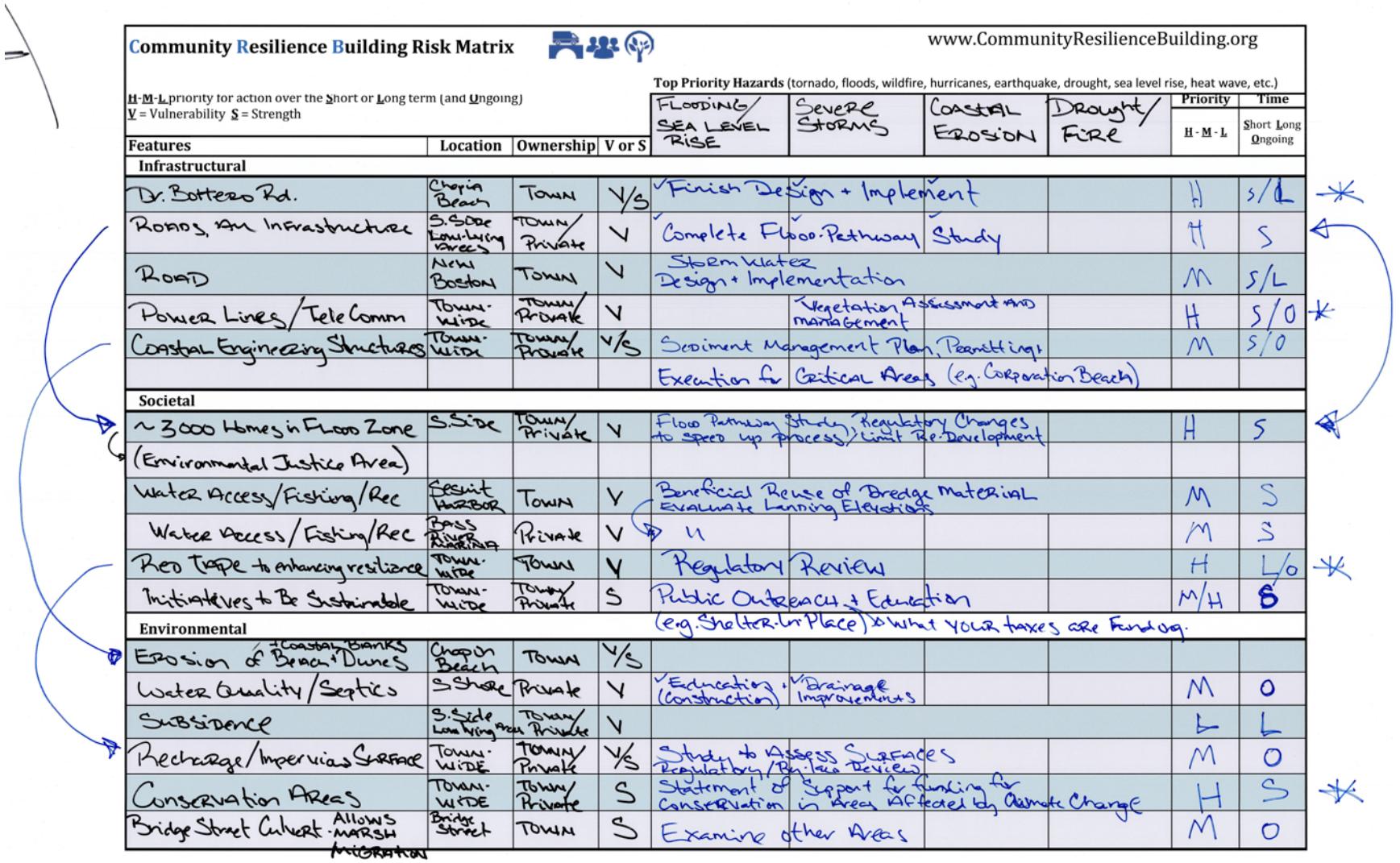
Woods Hole Sea Grant/Cape Cod Cooperative Extension

- Greg Berman, Coastal Processes Specialist

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	Flooding / Sea Level Rise	Severe Storms	Coastal Erosion	Drought / Fire	Priority H-M-L	Time Short Long Ongoing
Infrastructural									
Dr. Bottero Rd.	Chapin Beach	Town	V/S	✓Finish Design + Implement	✓	✓		H	S/L
Roads, All Infrastructure	S. Side Low-lying Areas	Town/ Private	V	✓Complete Flood Pathway	✓	✓Study		H	S
Road	New Boston	Town	V	Storm Water Design + Implementation				M	S/L
Power Lines / Tele Comm	Town-Wide	Town/ Private	V		Vegetation Assessment and management			H	S/O
Coastal Engineering Structures	Town-Wide	Town/ Private	V/S	Sediment Management Plan, Permitting;				M	S/O
				Execution for Critical Areas (e.g. Corporation Beach)					
Societal									
~3000 Homes in Flood Zone	S. Side	Town/ Private	V	Flood Pathway Study, Regulatory Changes to speed up process, Limit Re-Development				H	S
(Environmental Justice Area)									
Water Access/Fishing/Rec	Sesuit Harbor	Town	V	Beneficial Reuse of Dredge Material Evaluate Landing Elevation				M	S
Water Access/Fishing/Rec	Bass River Marina	Private	V	"				M	S
Red Tape to enhancing resilience	Town-Wide	Town	V	Regulatory Review				H	L/O
Initiatives to Be Sustainable	Town-Wide	Town/ Private	S	Public Outreach + Education (e.g. Shelter-in-Place) & what your taxes are Funding.				M/H	S
Environmental									
Erosion of Coastal Banks, Beach + Dunes	Chapin Beach	Town	V/S						
Water Quality / Septics	S Shore	Private	V	✓Education (Construction)	✓Drainage Improvements			M	O
Subsidence	S. Side Low-lying Areas	Town/ Private	V					L	L
Recharge / Impervious Surface	Town-Wide	Town/ Private	V/S	Study to Assess Surfaces Regulatory/By-laws Review				M	O
Conservation Areas	Town-Wide	Town/ Private	S	Statement of Conservation	Support for funding for in Areas Affected by Climate Change			H	S
Bridge Street Culvert - Allows Marsh Migration	Bridge Street	Town	S	Examine other Areas				M	O

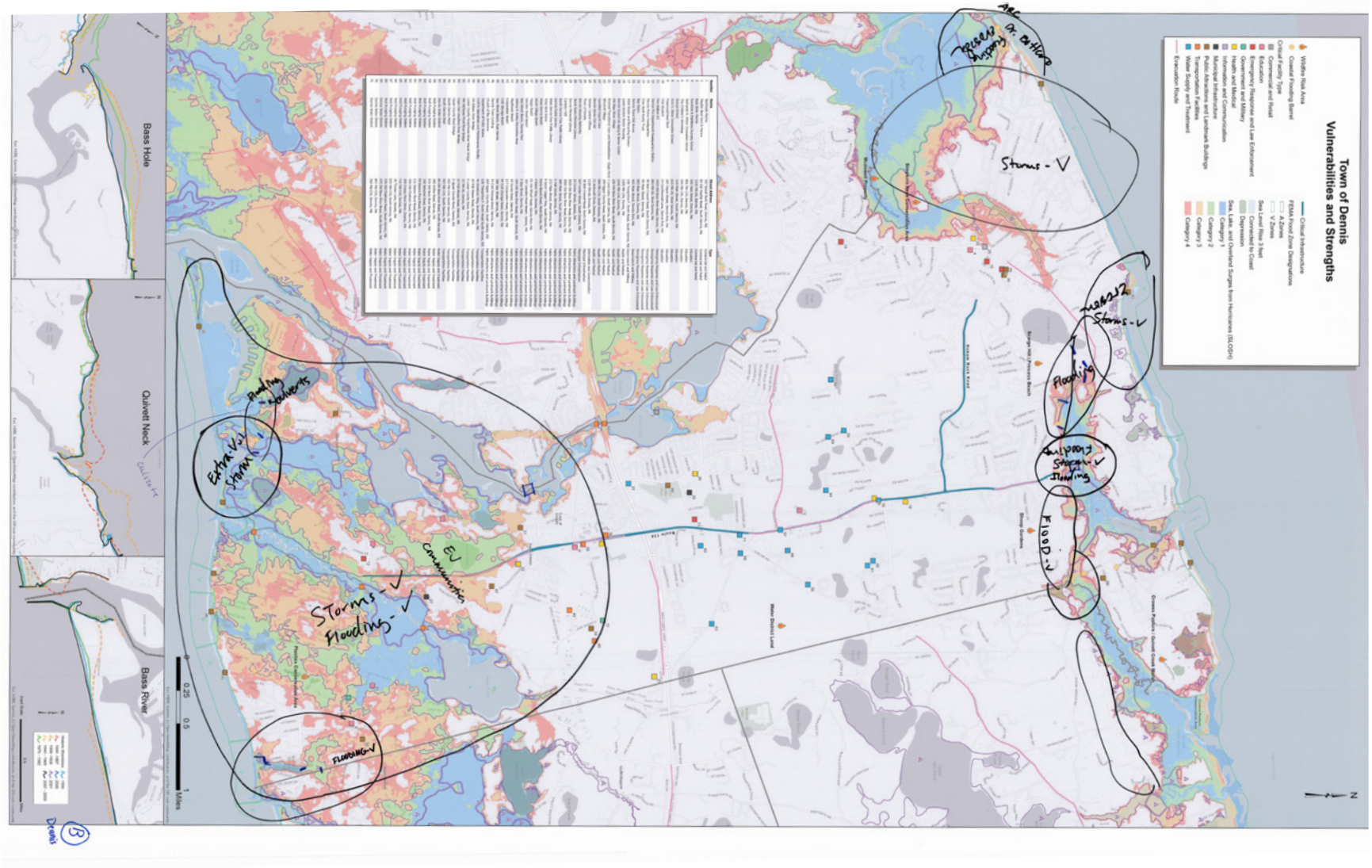
GROUP A RISK MATRIX 1

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

Features	Location	Ownership	V or S	Top Priority Hazards (tornado, floods, wildfire, hurricanes, earthquake, drought, sea level rise, heat wave, etc.)				Priority H-M-L	Time Short Long Ongoing
Infrastructural									
Societal									
(eg. CPC) Dedicated local Funding for Conservation	TOWN WIDE	TOWN	S	Statement of Support (See Page 1) + Public Education				H	S
Fees + State encouraging Re-Development in Vulnerable Areas	TOWN-WIDE	TOWN / Private	V	ID High Risk Properties				M	S
				Examine Un-Development Potential					
Environmental									
Sediment Supply/Management	TOWN-WIDE (eg. Corporation)	TOWN / Private	V/S	* See Page 1 - Coastal Engineering Structures				M	S/O

GROUP A RISK MATRIX 2



GROUP B BASEMAP

(B) Dennis

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	~~Coastal~~ Storms	Flooding (+Sea Level Rise)	Erosion	Fire (wild)	Priority H-M-L	Time Short Long Ongoing
Infrastructural									
Route 6A & Bridge Street	East Dennis	Mass DOT	V	• Coordinating with Mass DOT • Assess options for Bridge Street				M L	O/L S
Culverts	Bass River, Swan River, Sysuit, Quivett, Mill Pond, Crowell Canal		V	• Assessment & prioritization of culvert updates and replacement				H	S/O
Seaview Park Drainage (Rt 28)	East Dennis Southside (& Pound Pond)		V		• Final design for Stormwater mgt.			M	S
Firestation access	West Dennis			low lying road assessment				H	S
Dr. Bottero Road			V	• Follow/take appropriate action from report to be completed soon.				H	S/O
Corporation Beach Parking Lot			V						
Societal									
Residences + Businesses in South Side	Southside of Dennis		V	low lying road assessment				H	S
impacts on residences & basements SLR flooding	larger watersheds		V		• flood compliant basements			L	L/O
Bass River Park			V/S					?	
Septic Systems — elevated groundwater			V		• Assess economical alternatives			L	S/O
Tight tanks (septic)	water recharge areas (vulnerable)		S						
Stormwater water quality	impaired waterbodies		V	• Assessment + prioritization of SW infrastructure (MS4)				H	S/O
Environmental									
Salt Marshes			V/S						
Beaches & dunes			V/S						
Wildlife Habitat & corridors (displacement)	town wide		V	• preservation of undeveloped land • zoning to protect undeveloped land in floodplain				M M	O S
impaired waterbodies			V		• Continue to support wastewater Mgt. Planning			H	O
Crowe's Pasture	East Dennis		S						
Corporation Beach			V						

(1)

GROUP B RISK MATRIX 1

B

Dennis

Community Resilience Building Risk Matrix

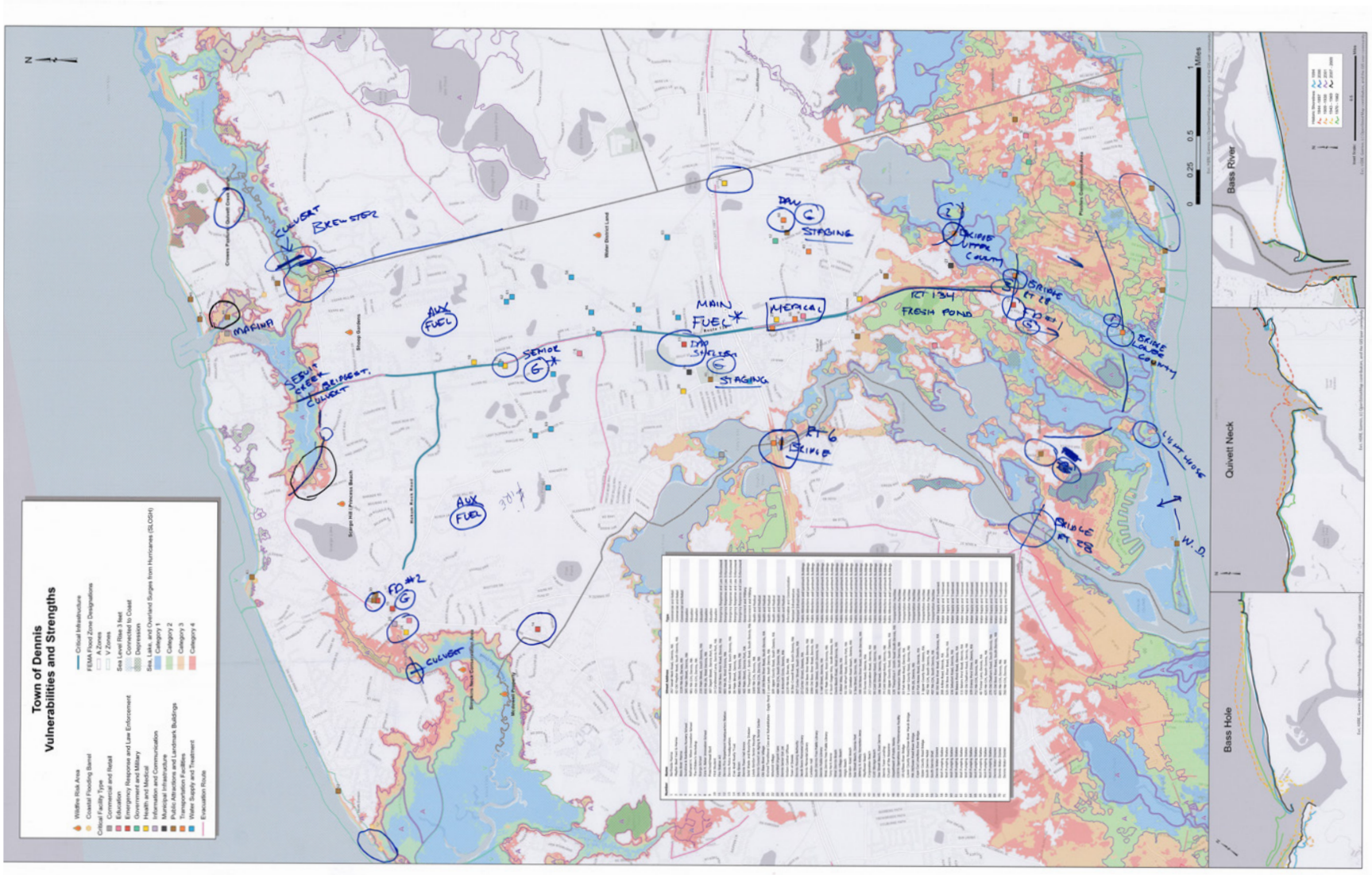
www.CommunityResilienceBuilding.org

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

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

Features	Location	Ownership	V or S	Storms	Flooding	Erosion	Fire (wild)	Priority H - M - L	Time Short Long Ongoing
Infrastructural									
Societal									
Shelters	Police Station High School		S	x ① Continue to evaluate x locations to ensure that they x meet community needs x ② Evaluate additional shelter locations ③ Retrofits as needed				1 2 3 H	1 S 2 S 3 S ✱
Evacuating Communities	North side South side		V	x • fund communication x plan regarding what actions residents should do in case of flooding.				H	S
Emergency Communication	town wide		S	x GIS analysis of most vuln. neighborhoods			*		
Quivett isolation	north side		V	x • low road study • Mass DOT coordination				H / m	S / O
Fire Response time	town wide		S				*		
EJ Communities (low income)	Dennisport West & South Dennis		V						
Environmental									
West Dennis Beach	West Dennis		V/S			*			
Navigation channels	Bass River, Quivett, Sesuit, Swan Pond, Chase Garden		V			* maint. dredging for water quality + shellfish		M	O
Wildfire prevention in protected areas	water district conservation lands		V				*Develop fire mgt. plan • evaluate phrag. removal • Controlled burns	H	S/O ✱

GROUP B RISK MATRIX 2



GROUP C BASEMAP

TEAM C

Community Resilience Building Risk Matrix — www.CommunityResilienceBuilding.org

JACK BRADY spokesperson

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.): Flooding (tidal or Rain), WIND, Nor'Easters

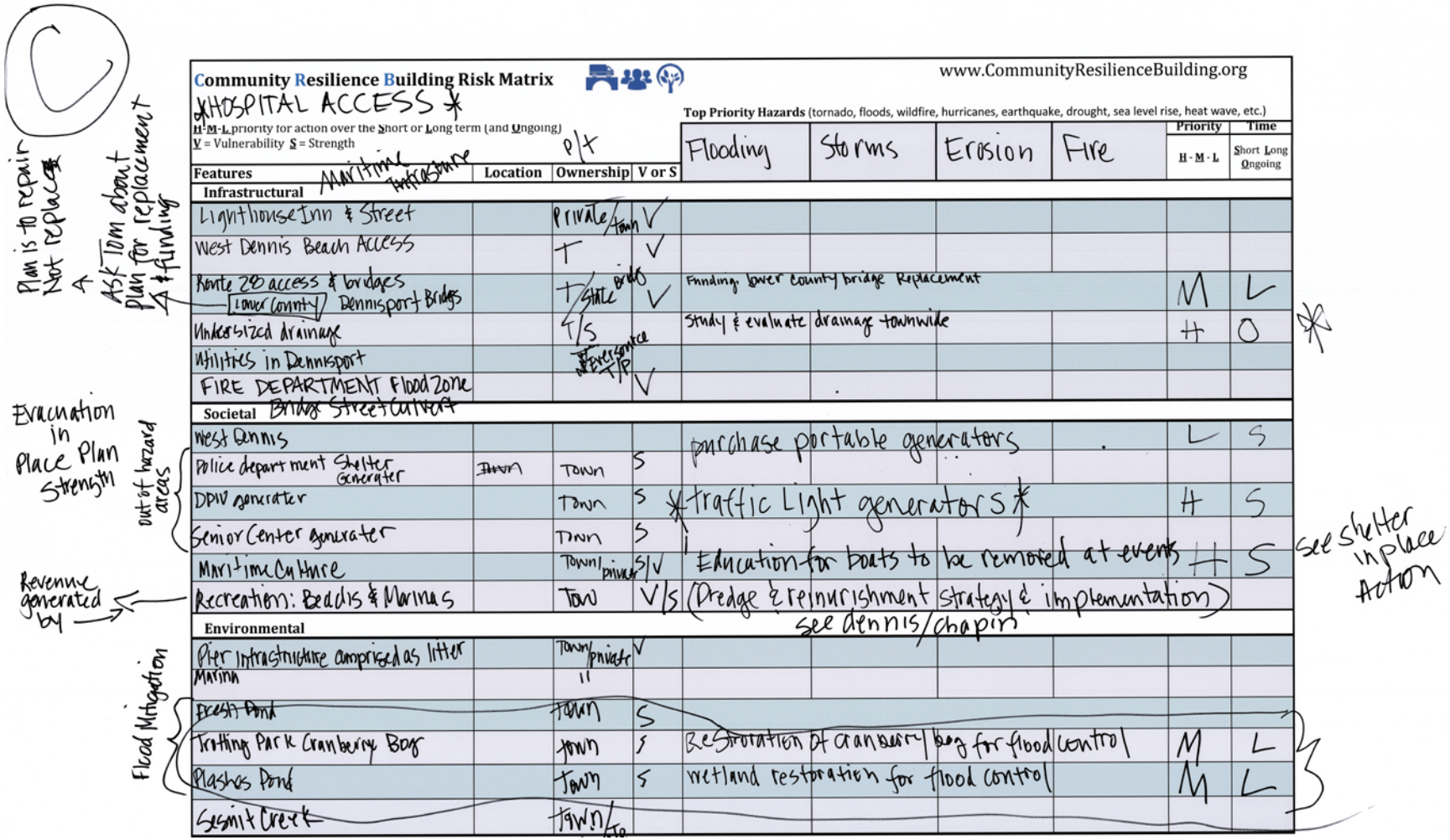
Features	Location	Ownership	V or S	Flooding SLR	Storms Wind Nor'Easters Hurricanes	Erosion	Fire	Priority H-M-L	Time Short Long Ongoing
Infrastructural Fuel Access	Into of town								
Chase Garden Creek culvert		Town	V						
School St. Crowes pasture Access		Town	V	Assessment of vulnerable roadways prioritize & design alternatives				H	S L/O
6A Paddocks Path flooding Airline		state	V	Redesign & Implement new culvert				H	L
Sesuit Harbor culverts		town	V	Evaluate Local bylaws & regulations regarding development in a flood plain.				L	S
Dr Potero Rd flooding		town	V						
Old wharf Rd		town	V						
Societal Southside Civic									
Crowes pasture neighborhood One egress		private/town	V						
Code Red Town Communication Police Facebook websites		town	S	Communication & Education strategies for shelter in place Outreach & Boats				H	S
West Dennis Beach		town	V						
Dennisport underwater		private/town	V	Storm tide pathways analysis for Southside				H	?S
Swan River Valley		private/town	V						
Elderly (Forest Hills, Forest Pines) Antonelli Circle			V	Warming/Cooling Stations identify & stage in addition to Shelters Equipe.				M	S
Environmental									
Chase Garden Creek Phrag		town	V	include Phrag removal in					
Cold Storage Phrag		town	V						
Sesuit Harbor Phrag		town/private	V						
Dry Marsh @ Chase Garden		town/p	S	Marsh migration Strategy including land aquistion				M	O
West Dennis Beach & Chapin		town	V	Renourish Beaches				H	S
Swan River Valley		private/town	S						

Water District Land as fire fire

Fire Mitigation Plan Controled Burns & Fire Roads — H — S

Margin notes: Bass River Bridge; ACCESS; Access to V. medicine Urgent; Private care No generator

GROUP C RISK MATRIX 1



Community Resilience Building Risk Matrix www.CommunityResilienceBuilding.org

HOSPITAL ACCESS *

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	Flooding	Storms	Erosion	Fire	Priority H-M-L	Time Short Long Ongoing
Infrastructural									
Lighthouse Inn & Street		Private/Town	V						
West Dennis Beach Access		T	V						
Route 28 access & bridges Lower County Dennisport Bridges		T/State	V	Funding, lower county bridge Replacement				M	L
Undersized drainage		T/S		study & evaluate drainage townwide				H	O
Utilities in Dennisport									
FIRE DEPARTMENT Flood Zone			V						
Societal									
West Dennis				purchase portable generators				L	S
Police department Shelter Generater		Town	S						
DPW generater		Town	S	* traffic Light generators *				H	S
Senior Center generater		Town	S						
Maritime Culture		Town/private	S/V	Education for boats to be removed at events				H	S
Recreation: Beaches & Marinas		Town	V/S	(Dredge & reinvigorment strategy & implementation) see dennis/chapin					
Environmental									
Pier Infrastructure comprised as litter		Town/private	V						
Marina		"							
~~Forest Pond~~		Town	S						
Trotting Park Cranberry Bog		town	S	Restoration of cranberry bog for flood control				M	L
Plashes Pond		Town	S	wetland restoration for flood control				M	L
Sesuit Creek		Town/Fed							

Plan is to repair Not replace

ASK Tom about plan for replacement & funding

Evacuation in Place Plan Strength

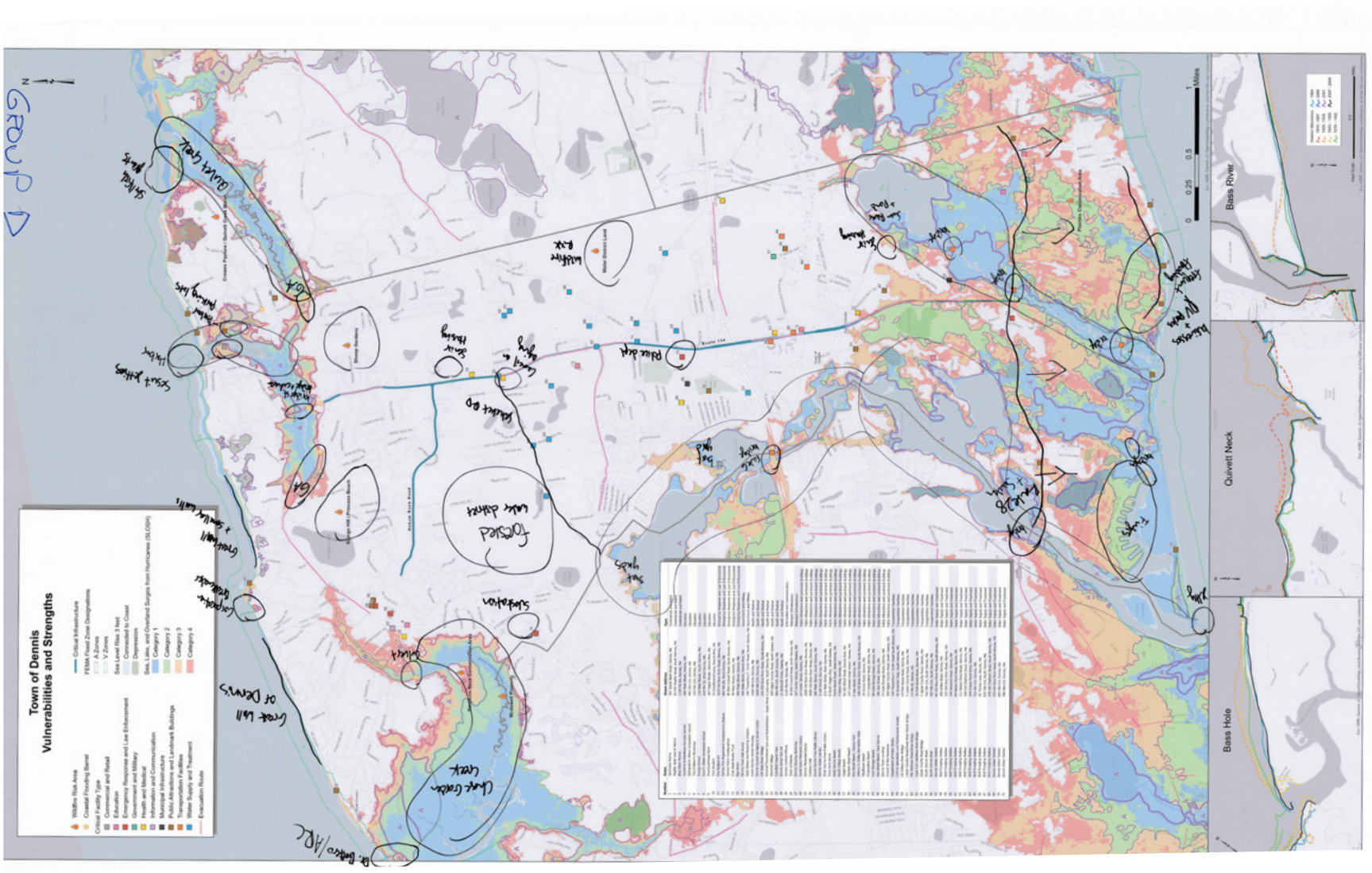
out of hazard areas

Revenue generated by

Flood Mitigation

see shelter in place Action

GROUP C RISK MATRIX 2



GROUP D BASEMAP

Community Resilience Building Risk Matrix

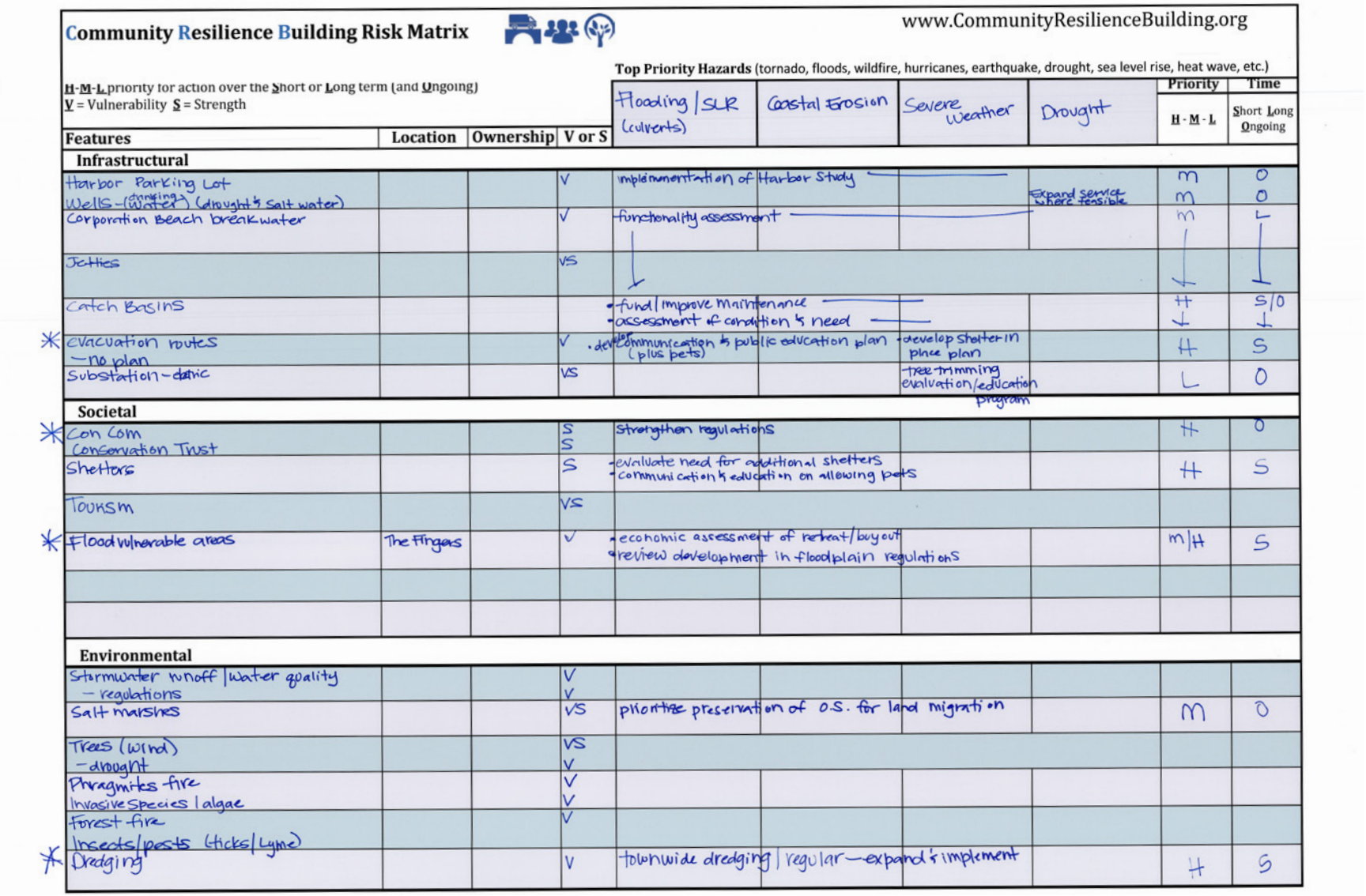
www.CommunityResilienceBuilding.org

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	Flooding/SLR (culverts)	Coastal Erosion	Severe Weather	Drought	Priority H-M-L	Time Short Long Ongoing
Infrastructural									
Bridges	Bass River/28 Bridge st.		V VS	assessment of bridge conditions relative to vulnerability				H	S
	Rt 6 Swan River(2) Lower County								
	Upper County Rt 28 Swan R. W. Dennis Bench(S)		S S V						
Roads	Chapin Beach Rd Dr. Botero		V V	vulnerability assessment feasibility study				H	S
	S Side Rt 28 Setucket		V S	functionability					
Culvert	New Boston Rd (map)		V	vulnerability/feasibility studies				H	S
Societal									
The Fingers (see flood vulnerable areas) Police Dept. location			V S						
Police/Fire Response (services) Neighborhood networking/groups (lack of)			S V						
Code Red system aging population			S V	enhance support improve communication of hazards (ex. flyer mailings)				H	S/O
Seasonal residents 24 hr. animal hospital			V S						
Senior housing locations Dennisport residents – Rt 28 low income housing			V V	• create information plan on hazards		• create business partnership for communication		M	O/L
Capabilities ARC			VS VS	• continue ongoing discussion of vulnerability solutions • CZM funding for management				H	O
Environmental									
Harbors ~~Sesuit~~ (I)	Sesuit	VS		prioritize implementation of harbor plan				H	O
Bass River Tributaries (I) Boat Yards (I)	Mayflair Bass River	S							
Swan River/Pond Chase Garden Creek		VS S		develop dredging plan review local bylaws				H H	O S
Quivet Creek Shellfish grants		VS VS							
Wildlife/Habitat Open Space		V S		review local bylaws					
South side Septic systems 'Great Wall of Dennis' (armored homes)		V V							

GROUP D RISK MATRIX 1



Community Resilience Building Risk Matrix www.CommunityResilienceBuilding.org

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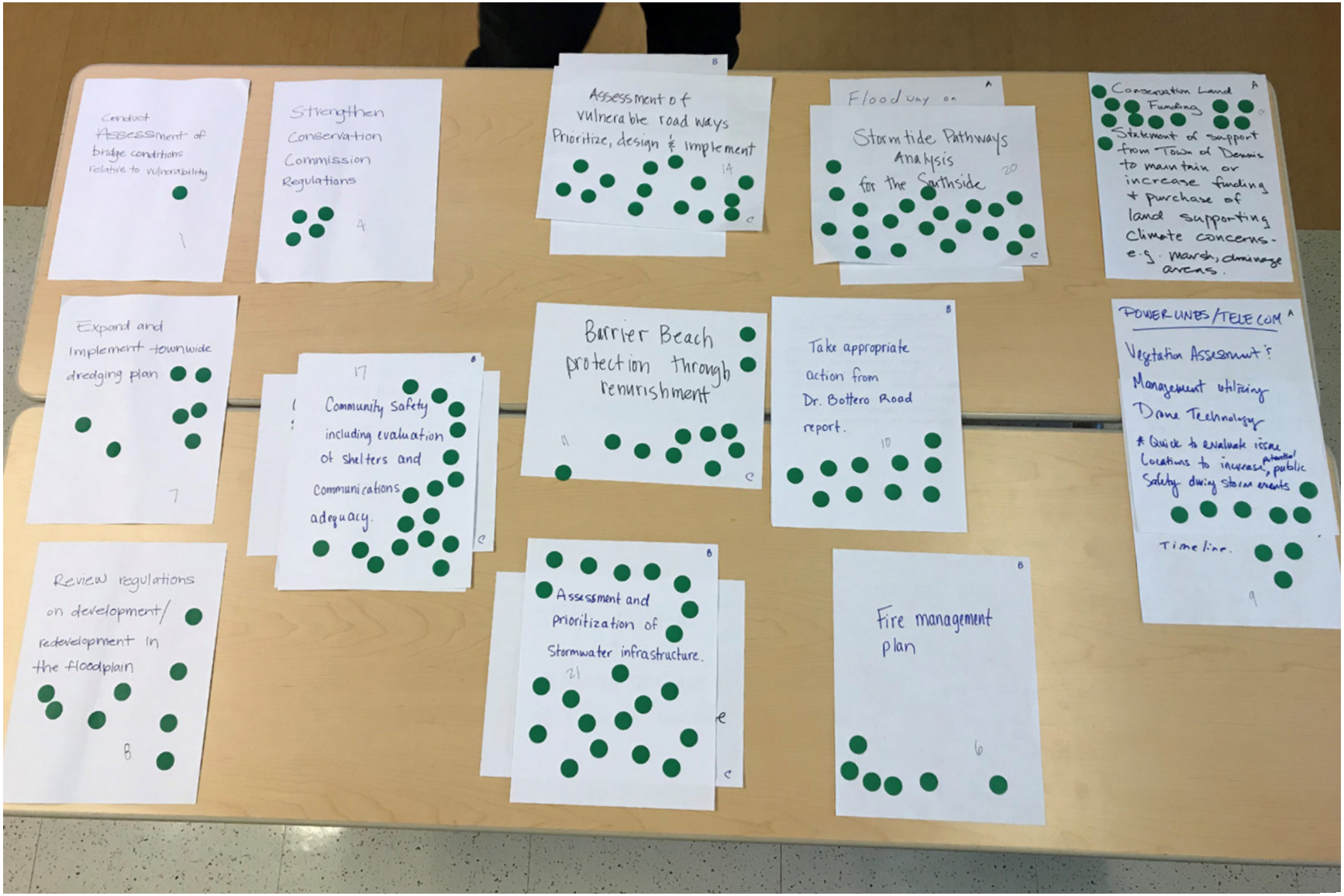
Top Priority Hazards (tornado, floods, wildfire, hurricanes, earthquake, drought, sea level rise, heat wave, etc.)

Features	Location	Ownership	V or S	Flooding / SLR (culverts)	Coastal Erosion	Severe Weather	Drought	Priority H-M-L	Time Short Long Ongoing
Infrastructural									
Harbor Parking Lot			V	implementation of Harbor Study				M	O
Wells - (drinking water) (drought & salt water)							Expand service where feasible	M	O
Corporation Beach breakwater			V	functionality assessment				M	L
Jetties			VS					L	L
Catch Basins				• fund / improve maintenance • assessment of condition & need				H L	S/O L
* Evacuation routes - no plan			V	• develop communication & public education plan (plus pets)		• develop Shelter in place plan		H	S
Substation - datric			VS			tree trimming evaluation/education program		L	O
Societal									
* Con Com Conservation Trust			S S	Strengthen regulations				H	O
Shelters			S	• evaluate need for additional shelters • communication & education on allowing pets				H	S
Tourism			VS						
* Flood vulnerable areas	The Fingers		V	• economic assessment of retreat/buyout • review development in floodplain regulations				M/H	S
Environmental									
Stormwater runoff / water quality - regulations			V V						
Salt marshes			VS	prioritize preservation of O.S. for land migration				M	O
Trees (wind) - drought			VS V						
Phragmites fire Invasive Species / algae			V V						
Forest fire Insects/pests (ticks/Lyme)			V						
* Dredging			V	townwide dredging / regular - expand & implement				H	S

GROUP D RISK MATRIX 2



DOT EXERCISE RESULTS

Municipal Vulnerability Preparedness Workshop

TOWN OF DENNIS
NOVEMBER 15, 2019

Today's Agenda

Morning

- 9:15 **Welcome** – Town of Dennis
- 9:30 **Workshop Overview, Introductions, and MVP Program Background** – Chloe Schaefer
- 9:45 **Science, Climate Projections, Resources** – Greg Berman
- 10:15 **Break**
- 10:25 **Small Team Exercise**
  - Team Orientation
  - Discuss and Identify Priority Hazards
  - Identify Vulnerable Features and Strengths
  - Prepare for Report-out
- 12:00 **Teams Report on Hazards, Vulnerabilities, Strengths**
- 12:30 **Lunch!**

Today's Agenda

Afternoon

- 1:00 **What's Next for MVP** – Greg Berman
- 1:10 **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 **Summary Discussion – Compile Top Actions**
- 4:15 **Wrap Up and Next Steps**
- 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*

TOWN PROJECT MANAGER

- Daniel Fortier - *Town Planner*

WORKSHOP PRESENTATION

MVP Program Background

EXECUTIVE ORDER 569, 9.16.16

An Integrated Climate Change Strategy for the Commonwealth

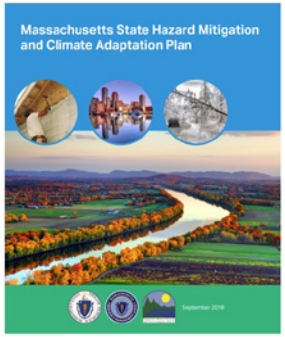
- Reducing greenhouse gas emissions to combat climate change
- Preparing for the impacts of climate change
  - State Adaptation Plan
  - Agency Vulnerability Assessments
  - Municipal Support
  - Climate Coordinators

ENVIRONMENTAL BOND BILL, 3.15.18

- $1.4 billion bond bill with focus on climate change resiliency
- $300 million for climate change adaptation
- Codifies EO 569

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

Municipal Vulnerability Preparedness (MVP) Program

- A **STATE AND LOCAL PARTNERSHIP** to build resilience to climate change by building capacity to respond to climate effects at the local level and pilot innovative adaptation practice
- Across the Commonwealth, **CITIES AND TOWNS NEED FINANCIAL AND TECHNICAL RESOURCES** to prepare their residents, businesses, and aging infrastructure

1. Engage community
2. Identify CC impacts and hazards
3. Complete assessment of vulnerabilities & strengths
4. Develop and prioritize actions
5. Take Action

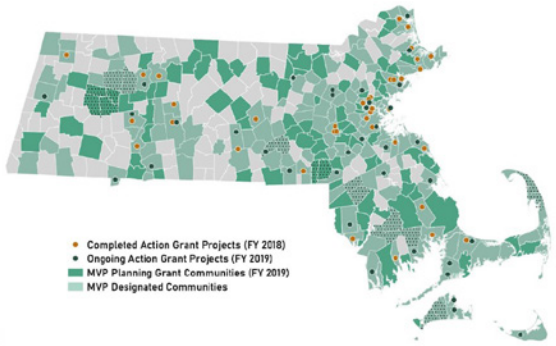
MVP Principles

- **COMMUNITY-LED PROCESS** that employs local knowledge and buy-in
- **UTILIZES PARTNERSHIPS** and leverages existing efforts
- Is based in **BEST AVAILABLE CLIMATE PROJECTIONS AND DATA**
- Incorporates principles of **NATURE-BASED SOLUTIONS**
- Demonstrates pilot potential and is **PROACTIVE**
- Reaches and responds to risks faced by environmental justice communities and **VULNERABLE POPULATIONS**
- **CERTIFIED** MVP providers

MVP 2017-2019

71% OF THE COMMONWEALTH/ **249** COMMUNITIES

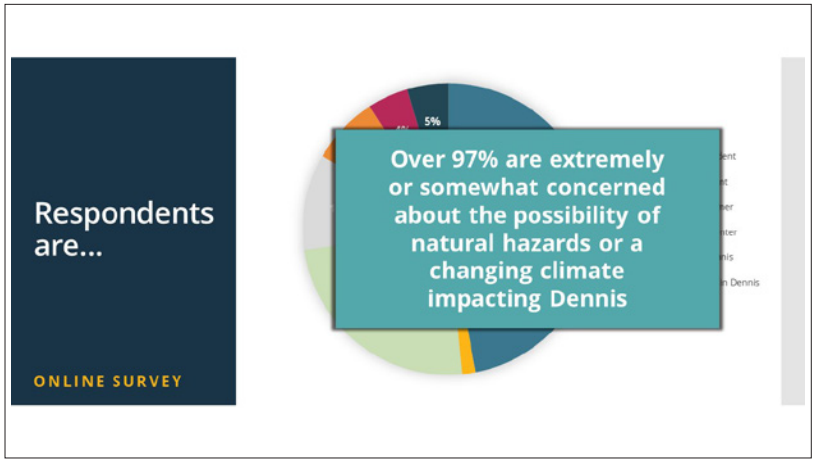
$17+ MILLION IN PLANNING AND ACTION GRANTS

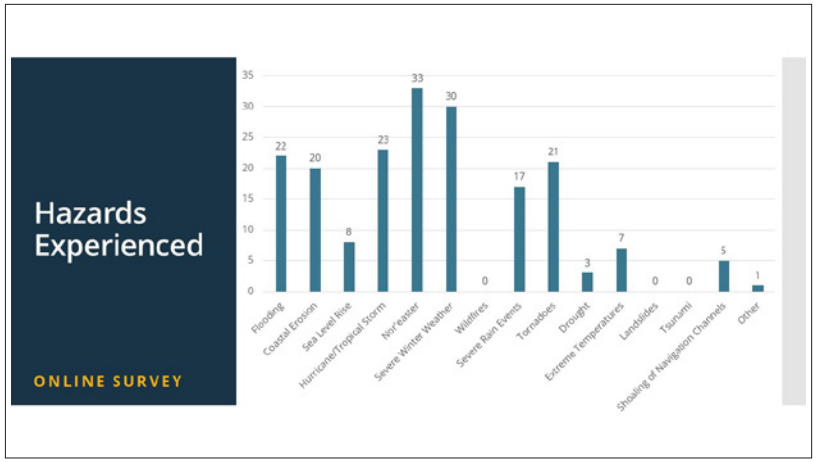


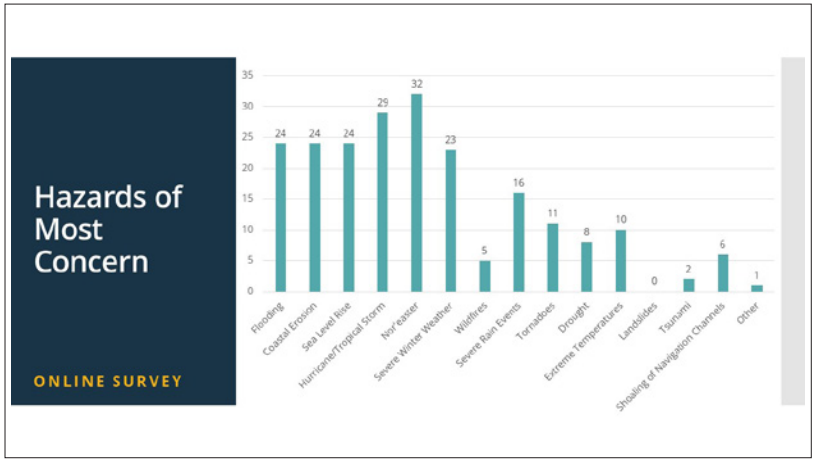
Overview of the Process

- PREPARE FOR THE WORKSHOP
- CHARACTERIZE HAZARDS
- IDENTIFY COMMUNITY VULNERABILITIES AND STRENGTHS
- IDENTIFY AND PRIORITIZE COMMUNITY ACTIONS
- DETERMINE OVERALL PRIORITY ACTIONS
- PUT IT ALL TOGETHER – FINAL REPORT
- MOVE FORWARD

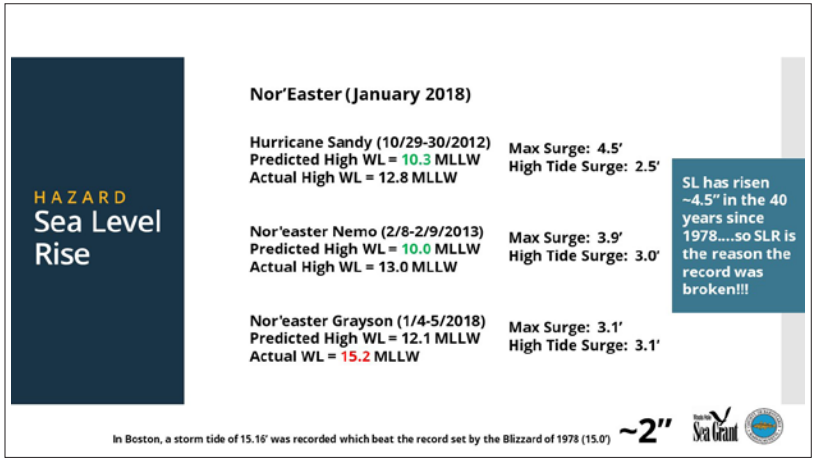
WORKSHOP PRESENTATION



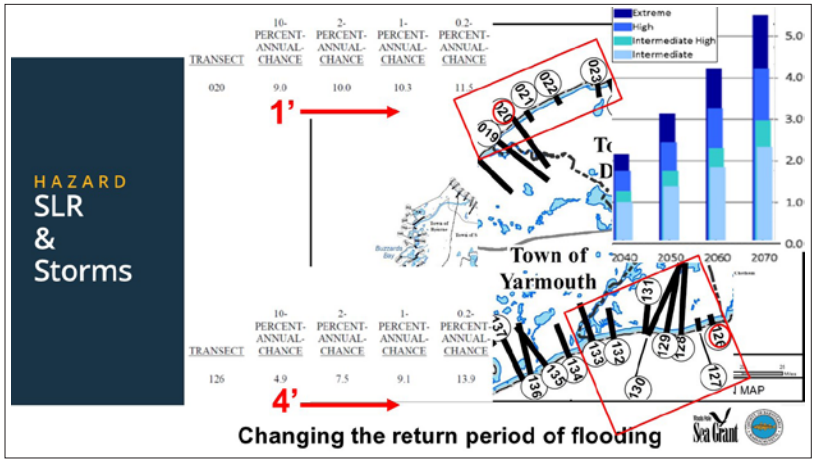


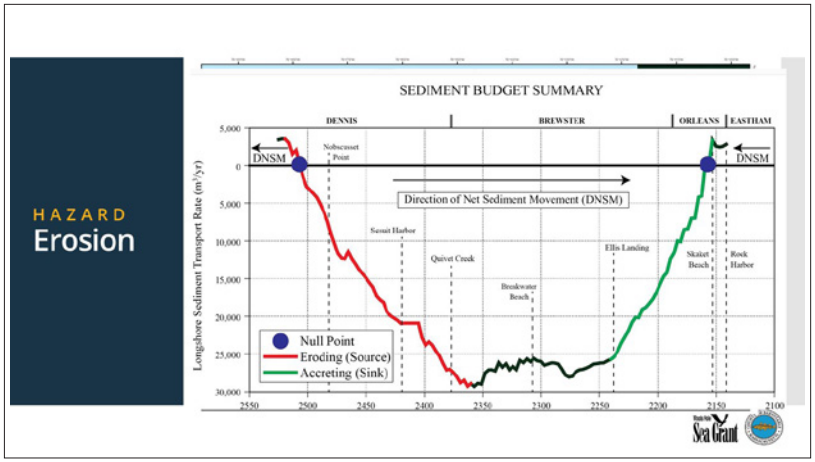


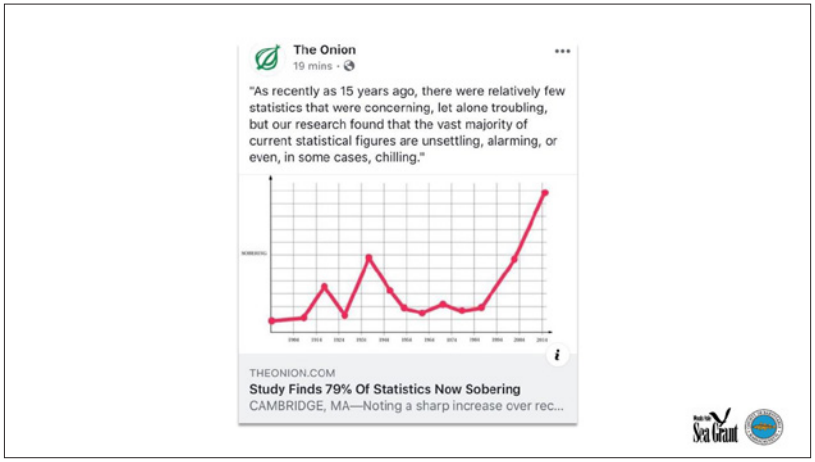
WORKSHOP PRESENTATION



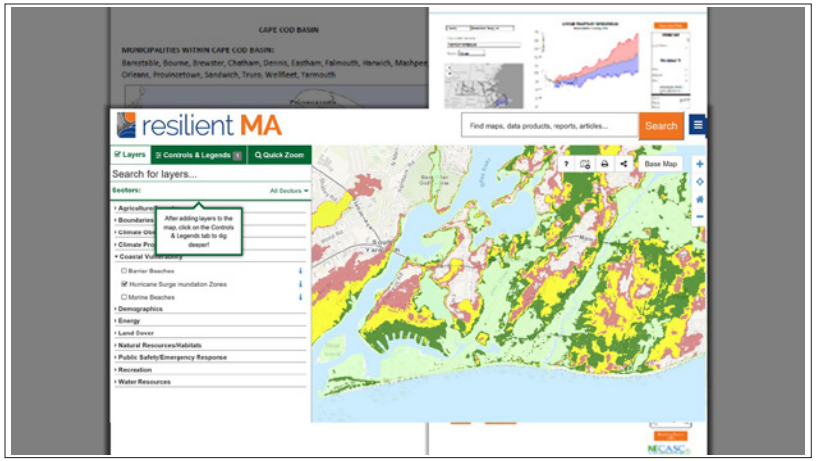
WORKSHOP PRESENTATION

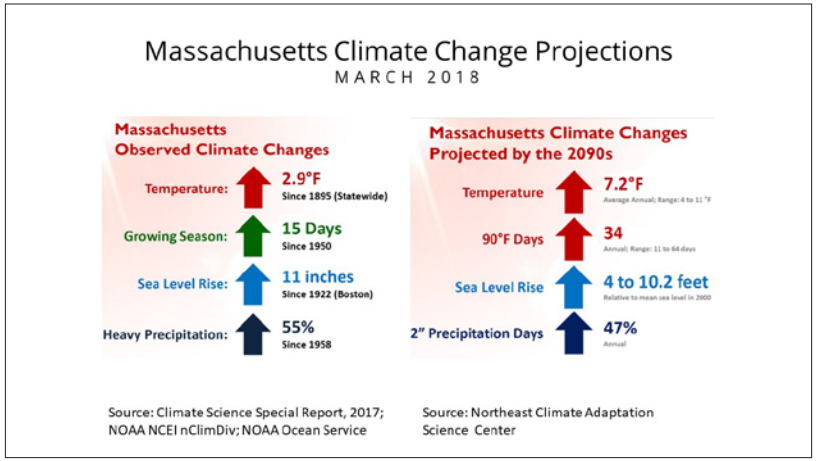


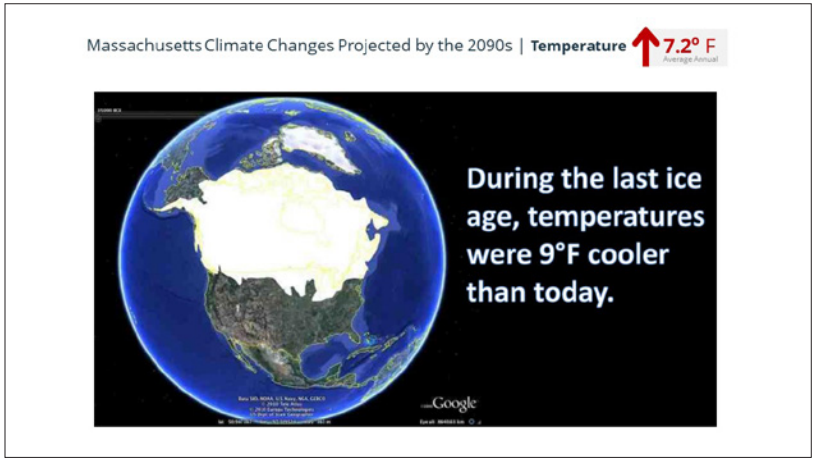


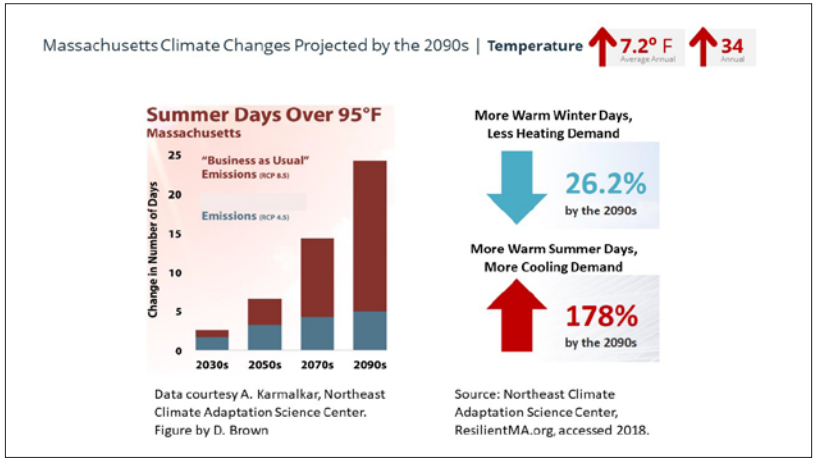


WORKSHOP PRESENTATION

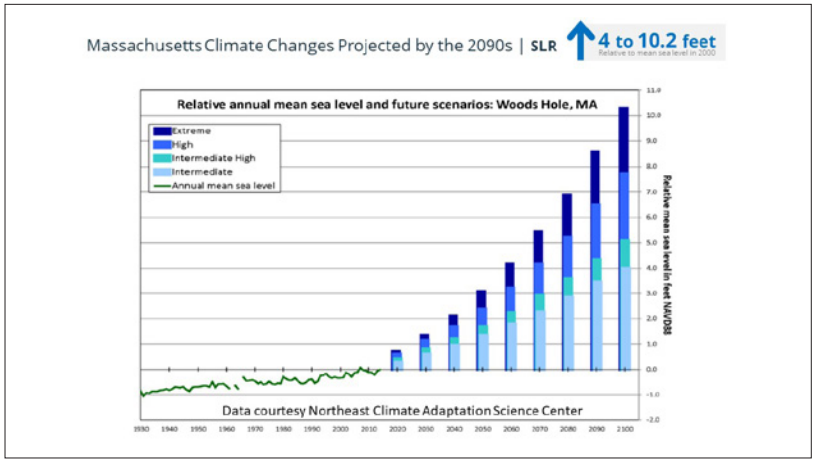






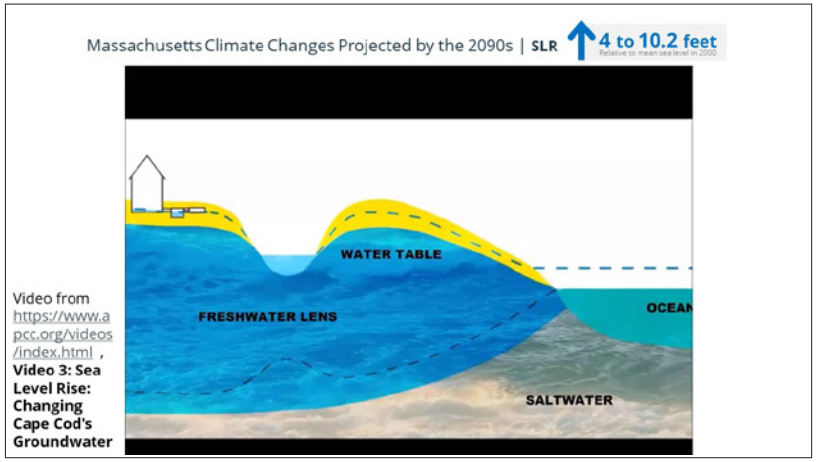


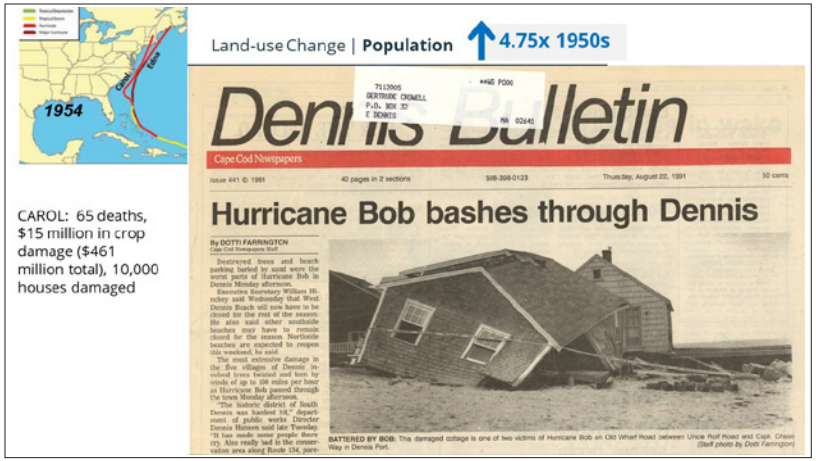
WORKSHOP PRESENTATION

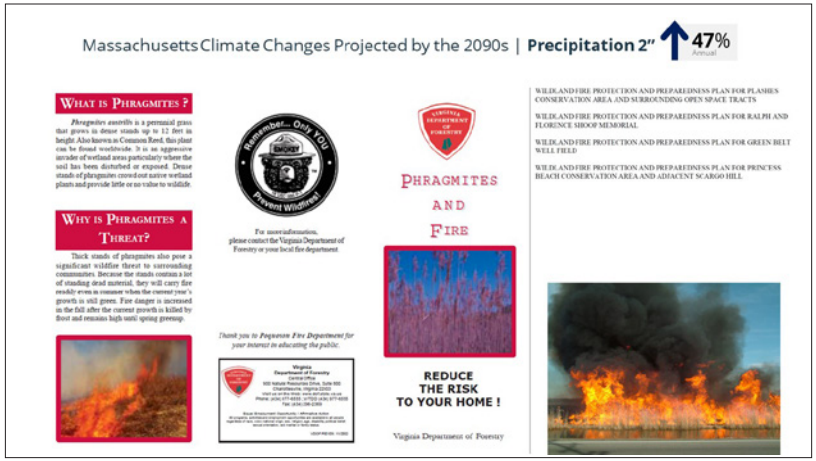

Massachusetts Climate Changes Projected by the 2090s | SLR
4 to 10.2 feet
Relative annual mean sea level and future scenarios: Woods Hole, MA
Extreme
High
Intermediate High
Intermediate
Annual mean sea level
Relative mean sea level in feet NAVD88
Data courtesy Northeast Climate Adaptation Science Center


Massachu
Extreme
High
Intermediate High
Intermediate
2040
2050
2060

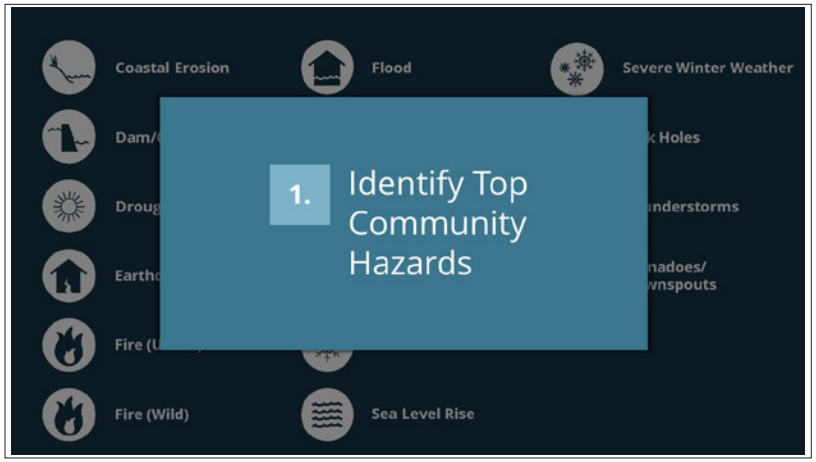

Massa
Extreme
High
Intermediate High
Intermediate
2040
2050
2060

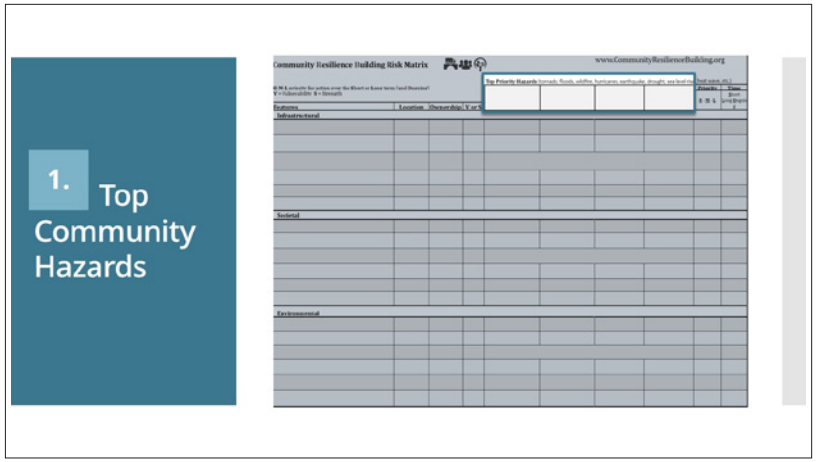

Massachusetts Climate Changes Projected by the 2090s | SLR
4 to 10.2 feet
WATER TABLE
FRESHWATER LENS
SALTWATER
Video from https://www.apcc.org/videos/index.html , Video 3: Sea Level Rise: Changing Cape Cod's Groundwater

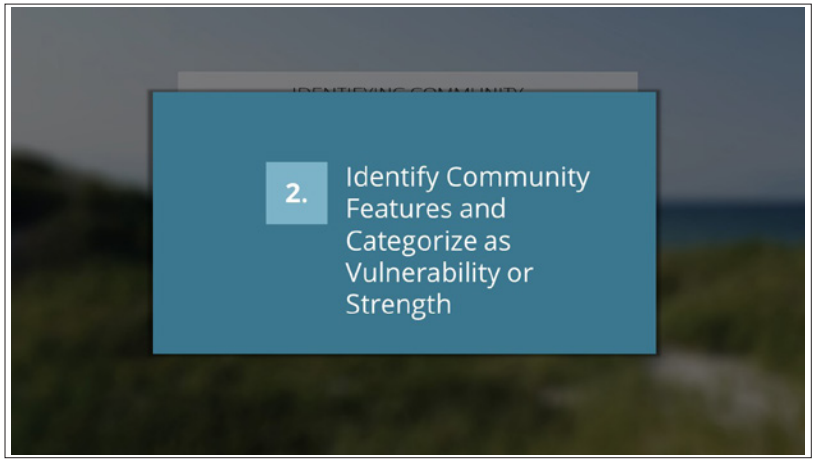


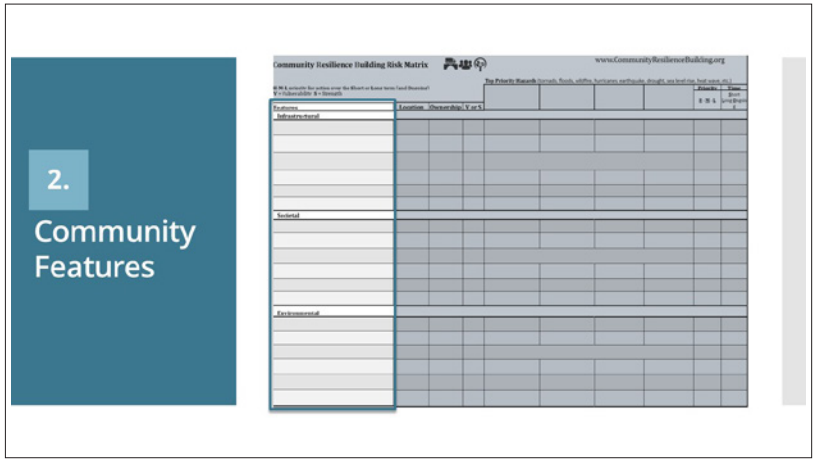


WORKSHOP PRESENTATION

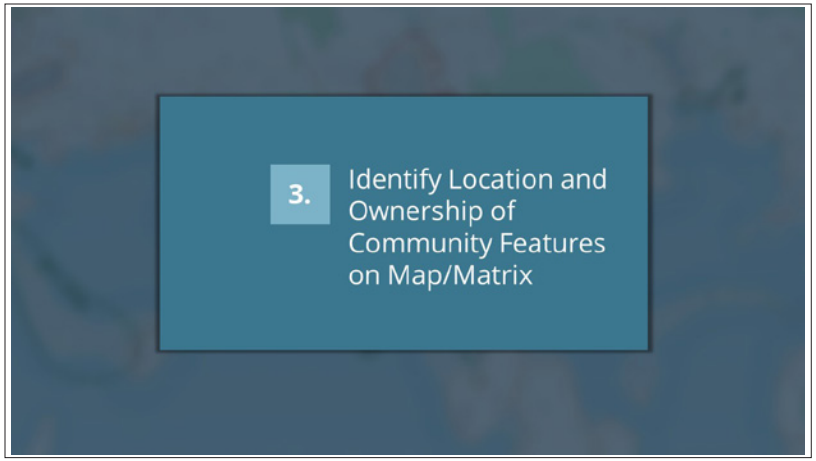


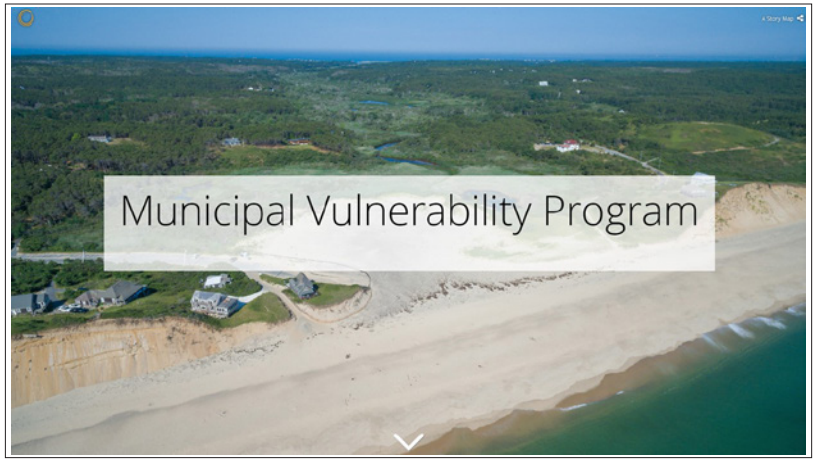


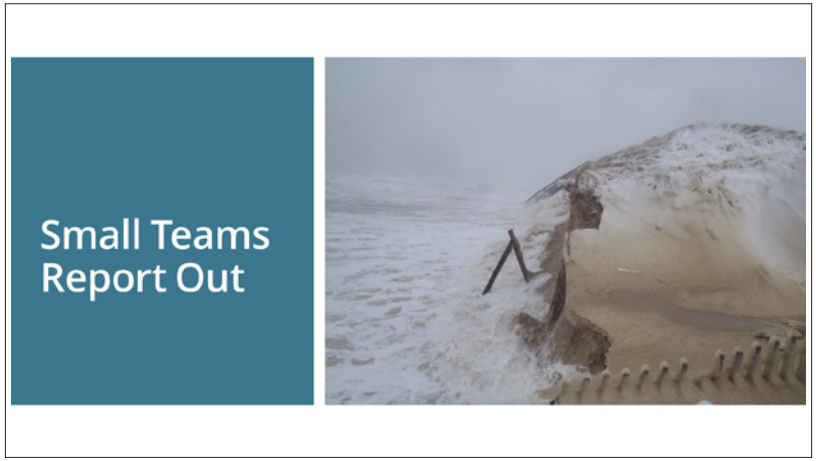




WORKSHOP PRESENTATION







WORKSHOP PRESENTATION

Lunch!

Today's Agenda

Afternoon

1:00 **What's Next for MVP** – Greg Berman
1:10 **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 **Summary Discussion – Compile Top Actions**
4:15 **Wrap Up and Next Steps**
4:30 **Adjourn**

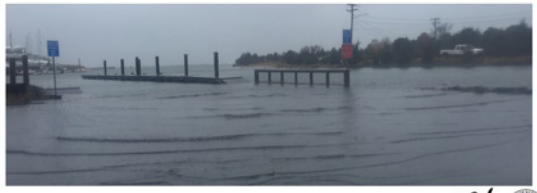
What's Next for MVP?

Greg Berman, Coastal Processes Specialist

Woods Hole Sea Grant & 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



WORKSHOP PRESENTATION

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.

MVP Action Grants

- Energy Resilience Strategies
- Chemical Safety and Climate Vulnerabilities
- Nature-Based Flood Protection, Drought Prevention, Water Quality, and Water Infiltration Techniques
- Nature-Based Infrastructure and Technology Solutions to Reduce Vulnerability to Extreme Heat and Poor Air Quality
- Nature-Based Solutions to Reduce Vulnerability to Climate Change 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

WORKSHOP PRESENTATION

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
Currently open	Not open yet
$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

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

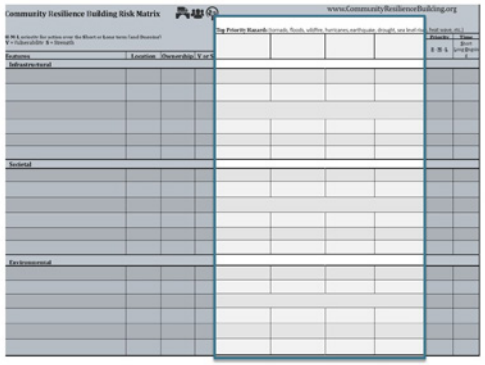
GETTING STARTED

- Identify Small Team Spokesperson
- Clarifying questions

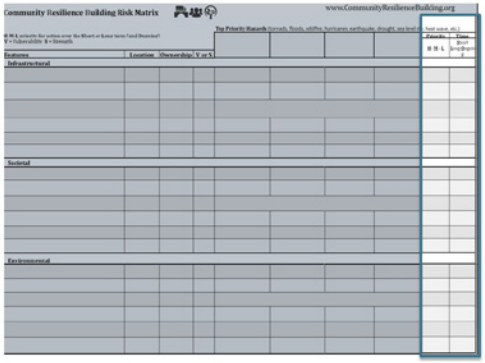
EXERCISE

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

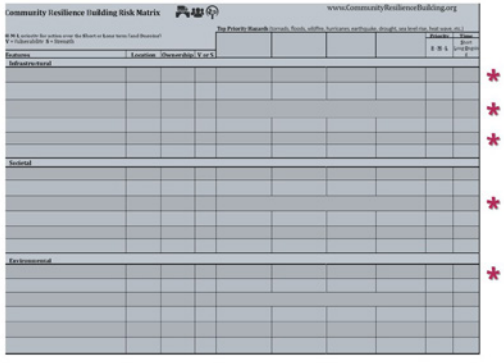
1. Identify Actions



2. Assign Priority and Urgency



3. Identify Top Priority Actions



WORKSHOP PRESENTATION

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
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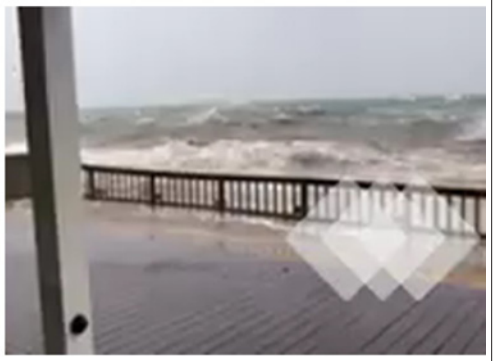
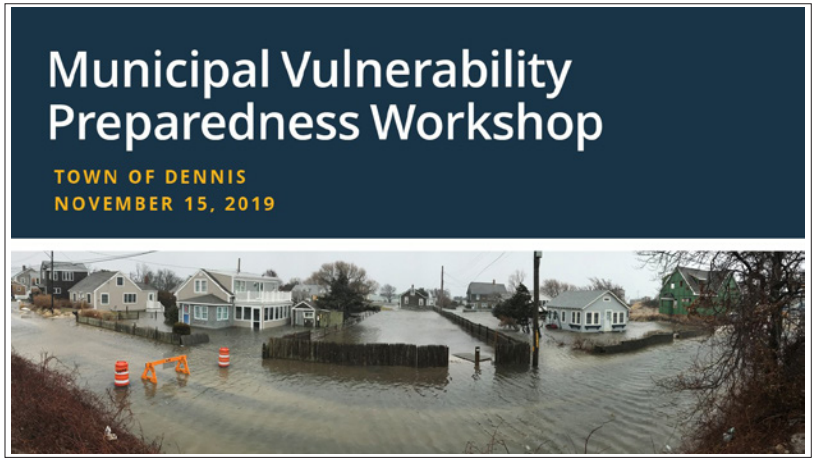
Break



Small Teams Report Out

Top Priority Actions

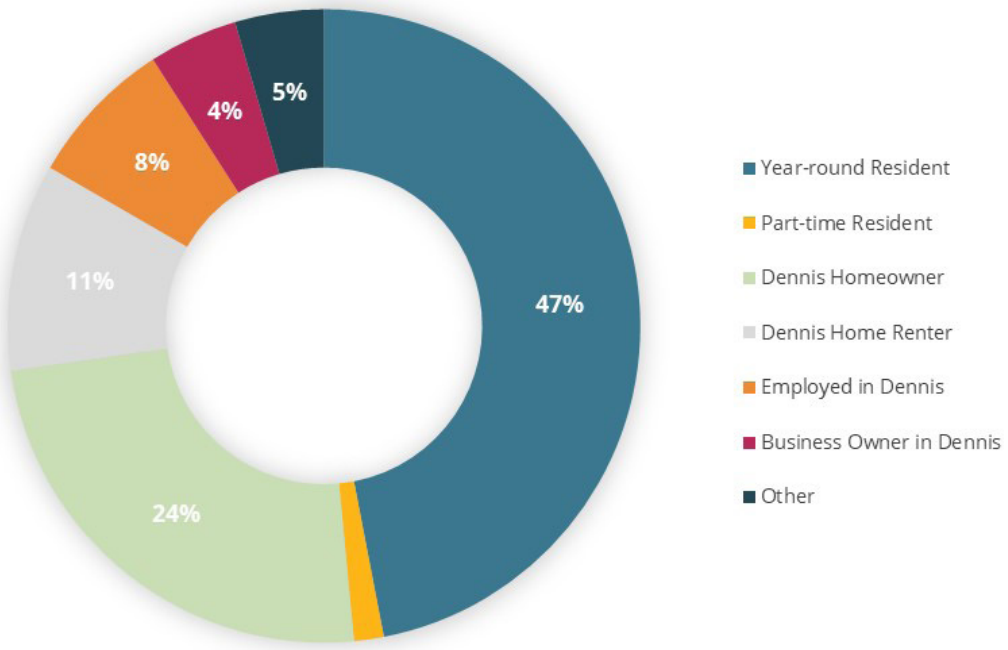
Selecting Priorities: Dot Exercise



WORKSHOP PRESENTATION

Please tell us about yourself

ONLINE SURVEY

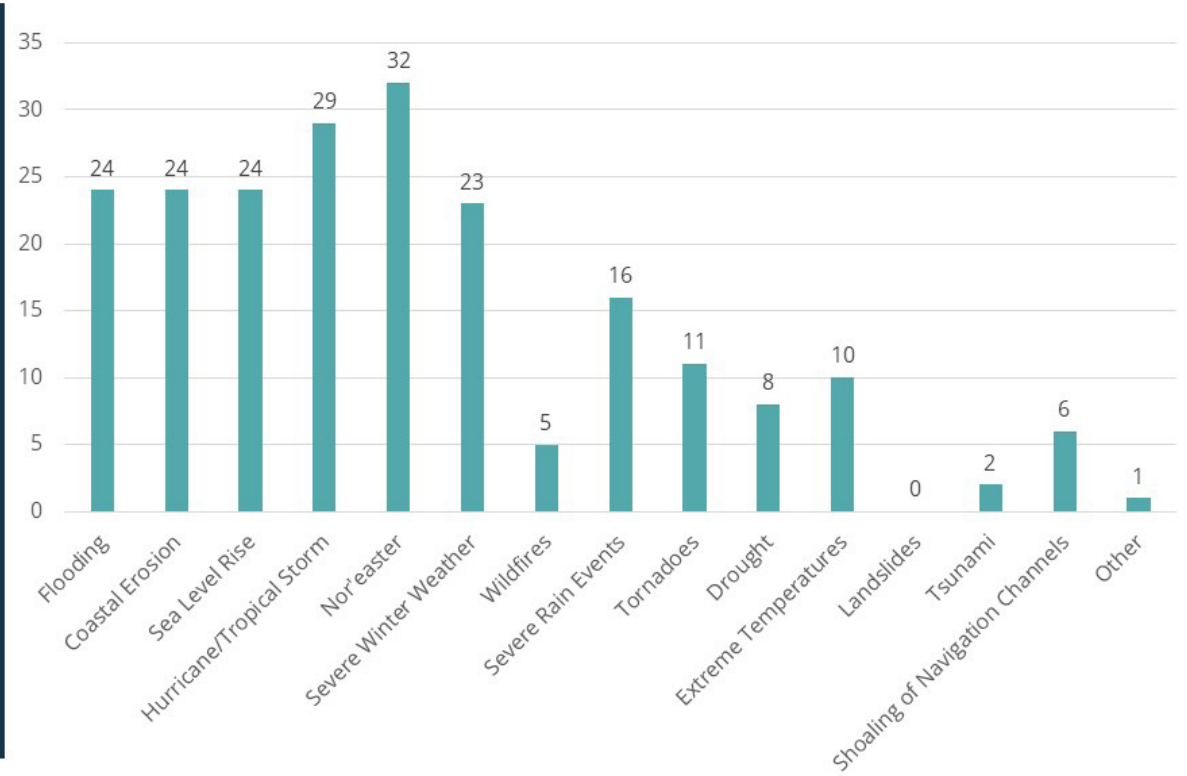


Other: Self employed | Grew up in Dennis – now live in Brewster | Our non-profit protects open space in the Town

PRE-WORKSHOP SURVEY RESULTS

Which of the following hazards most concern you?

ONLINE SURVEY

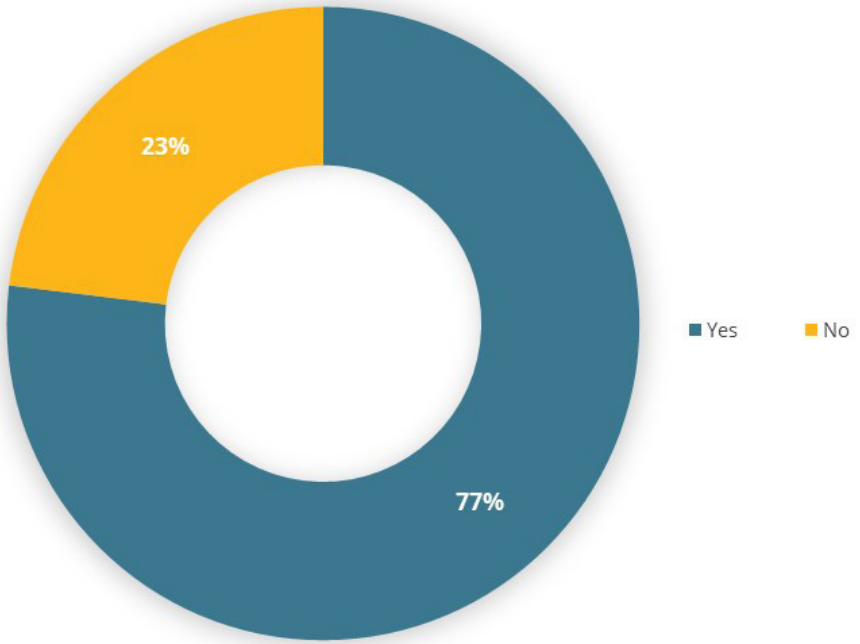


Other: Town needs to also address carbon footprint

PRE-WORKSHOP SURVEY RESULTS

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

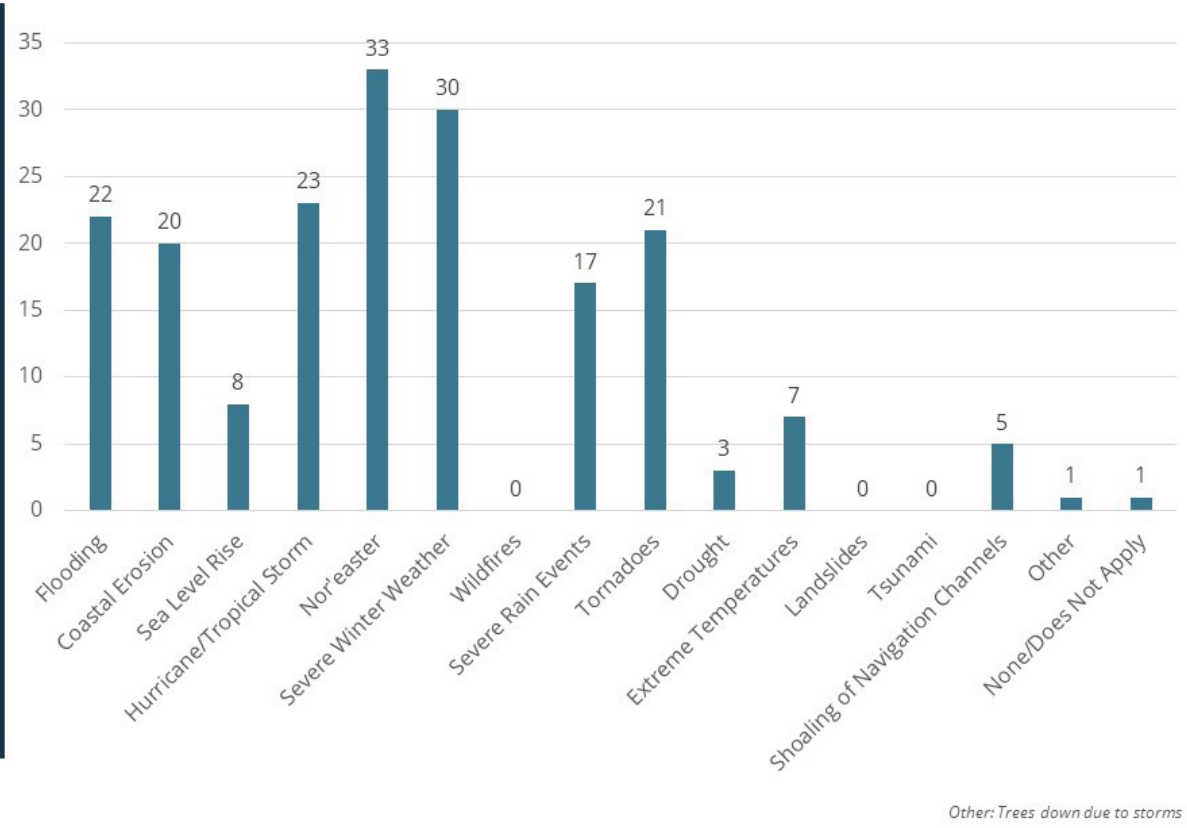
ONLINE SURVEY



PRE-WORKSHOP SURVEY RESULTS

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

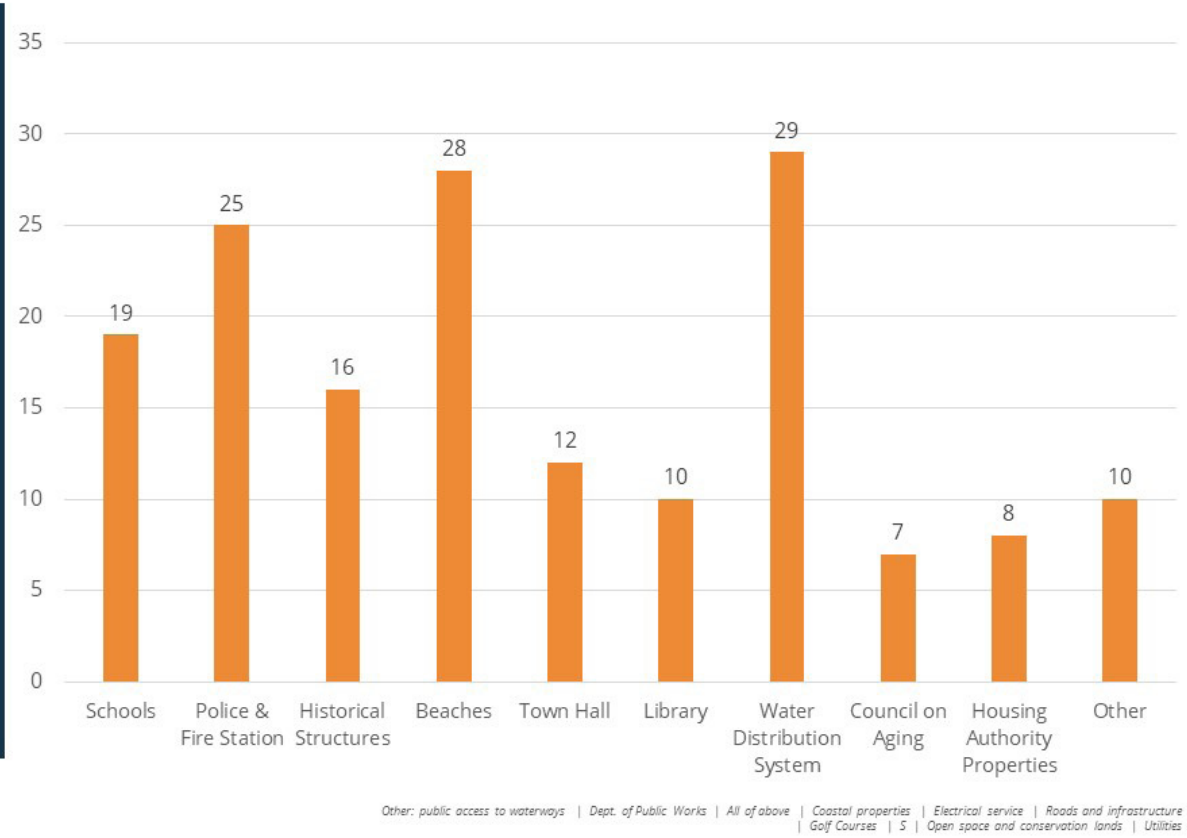
ONLINE SURVEY



PRE-WORKSHOP SURVEY RESULTS

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

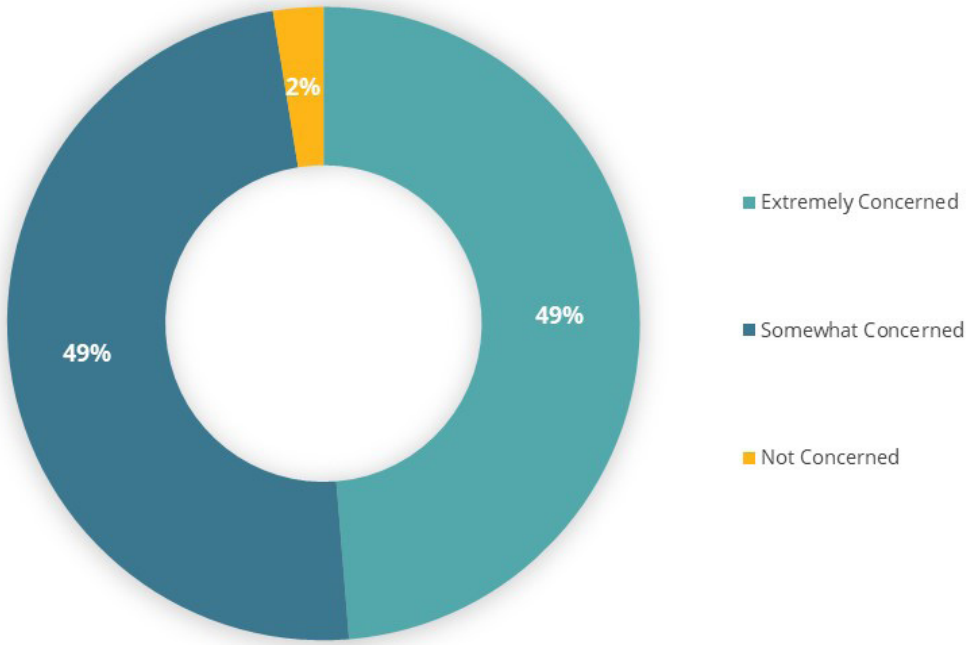
ONLINE SURVEY



PRE-WORKSHOP SURVEY RESULTS

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

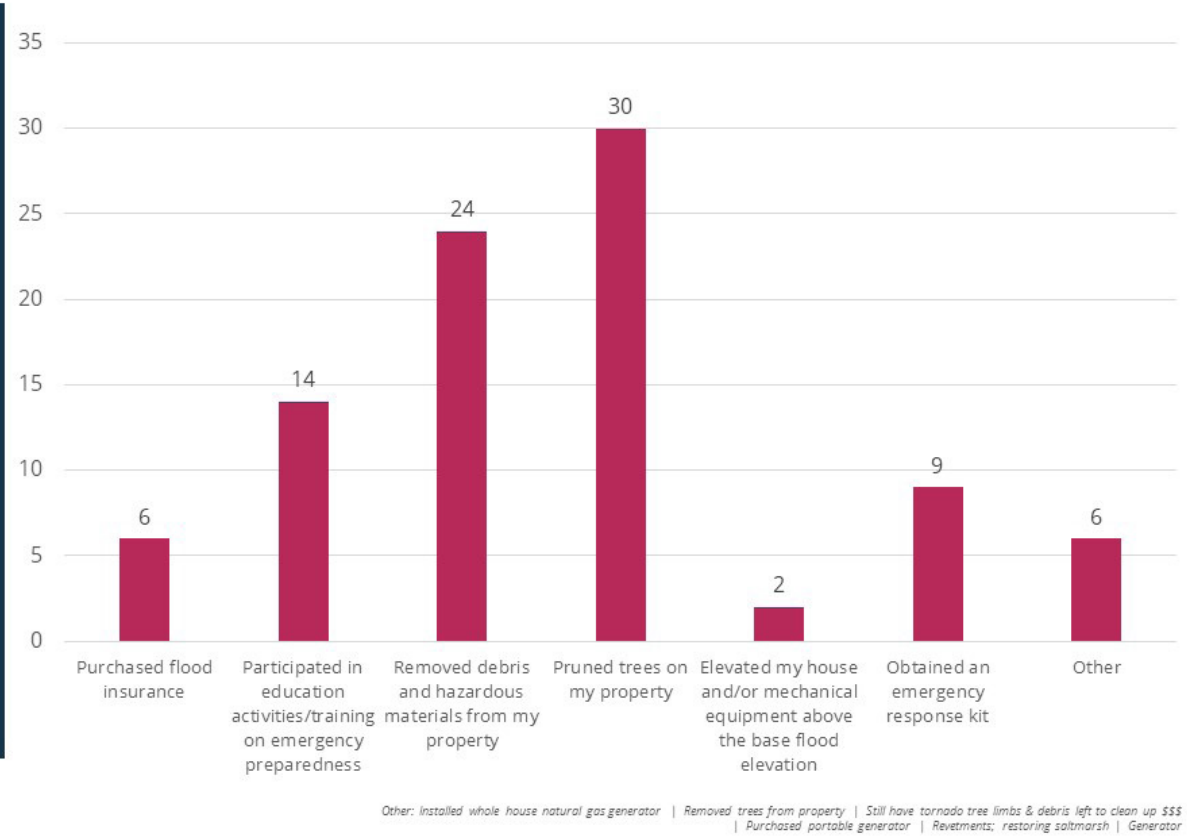
ONLINE SURVEY



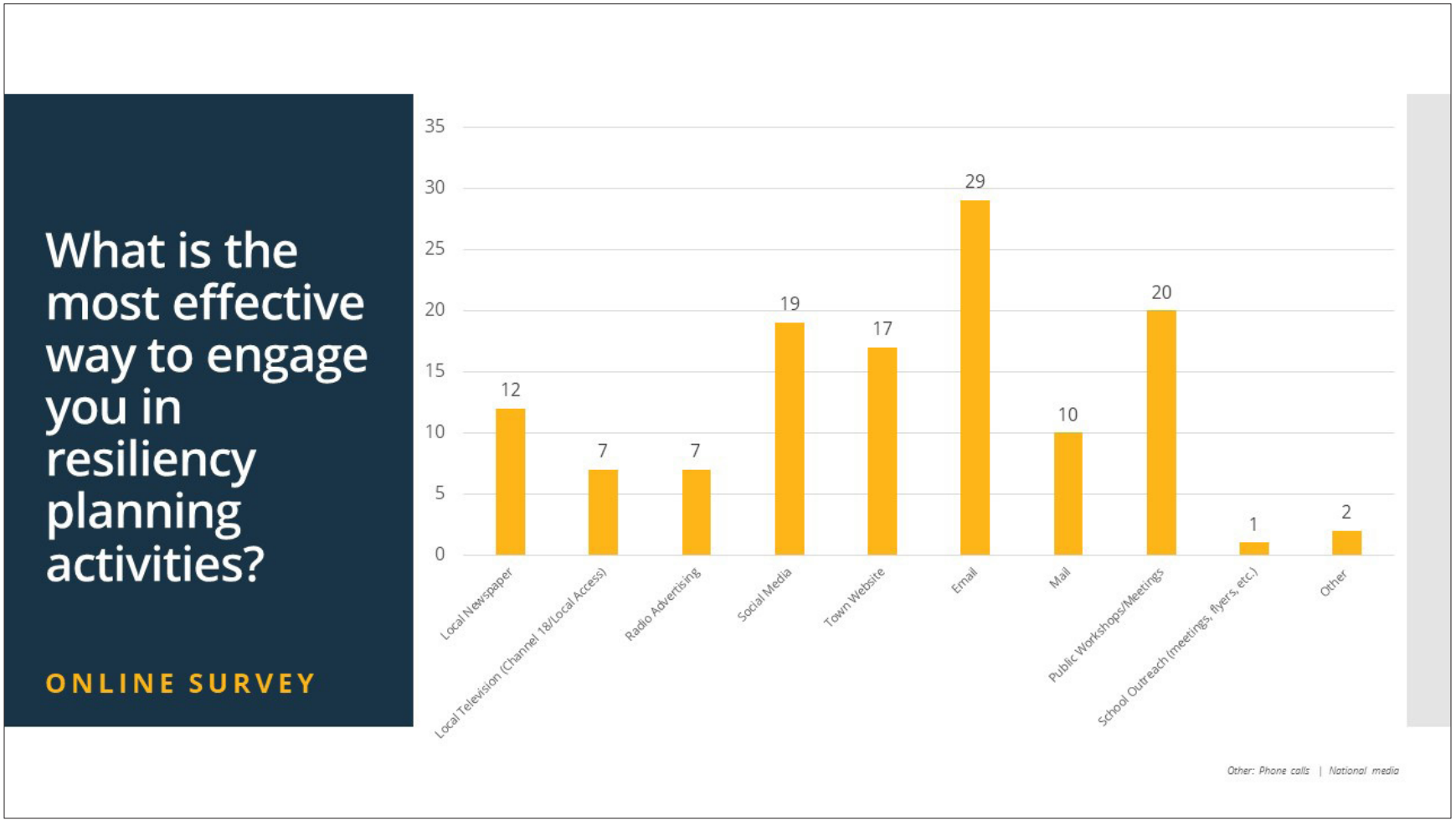
PRE-WORKSHOP SURVEY RESULTS

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

ONLINE SURVEY



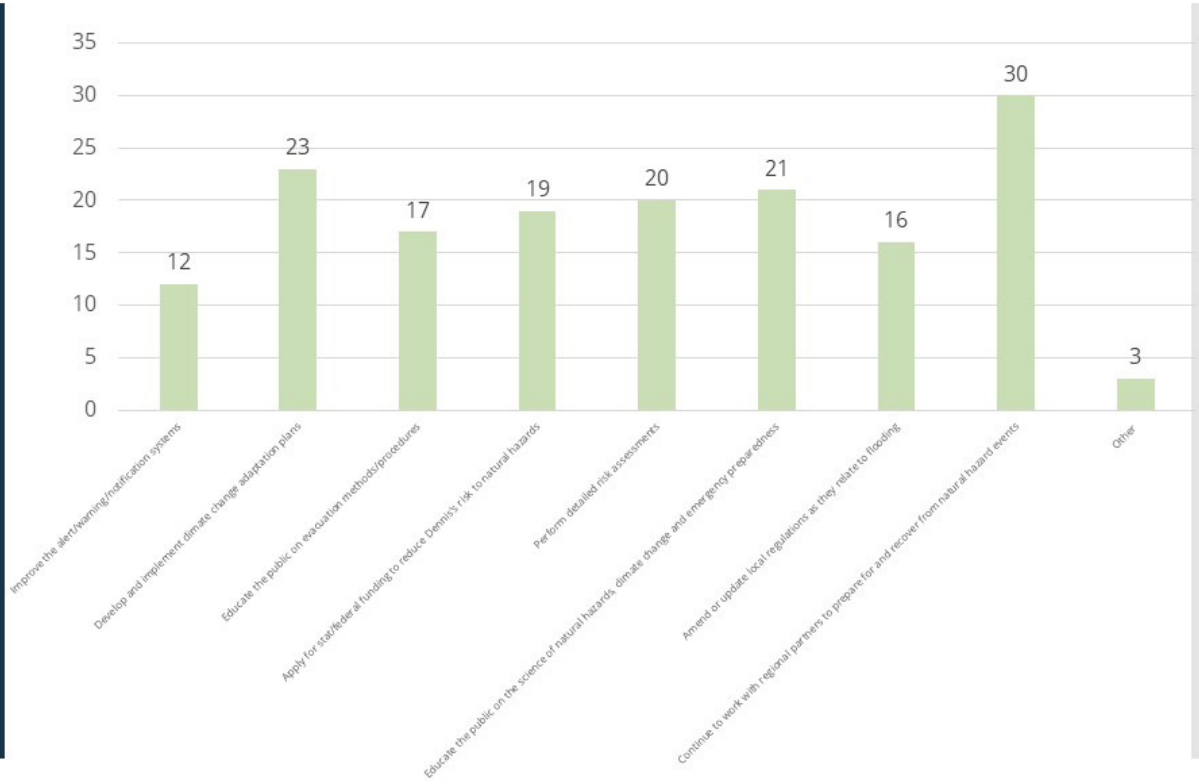
PRE-WORKSHOP SURVEY RESULTS



PRE-WORKSHOP SURVEY RESULTS

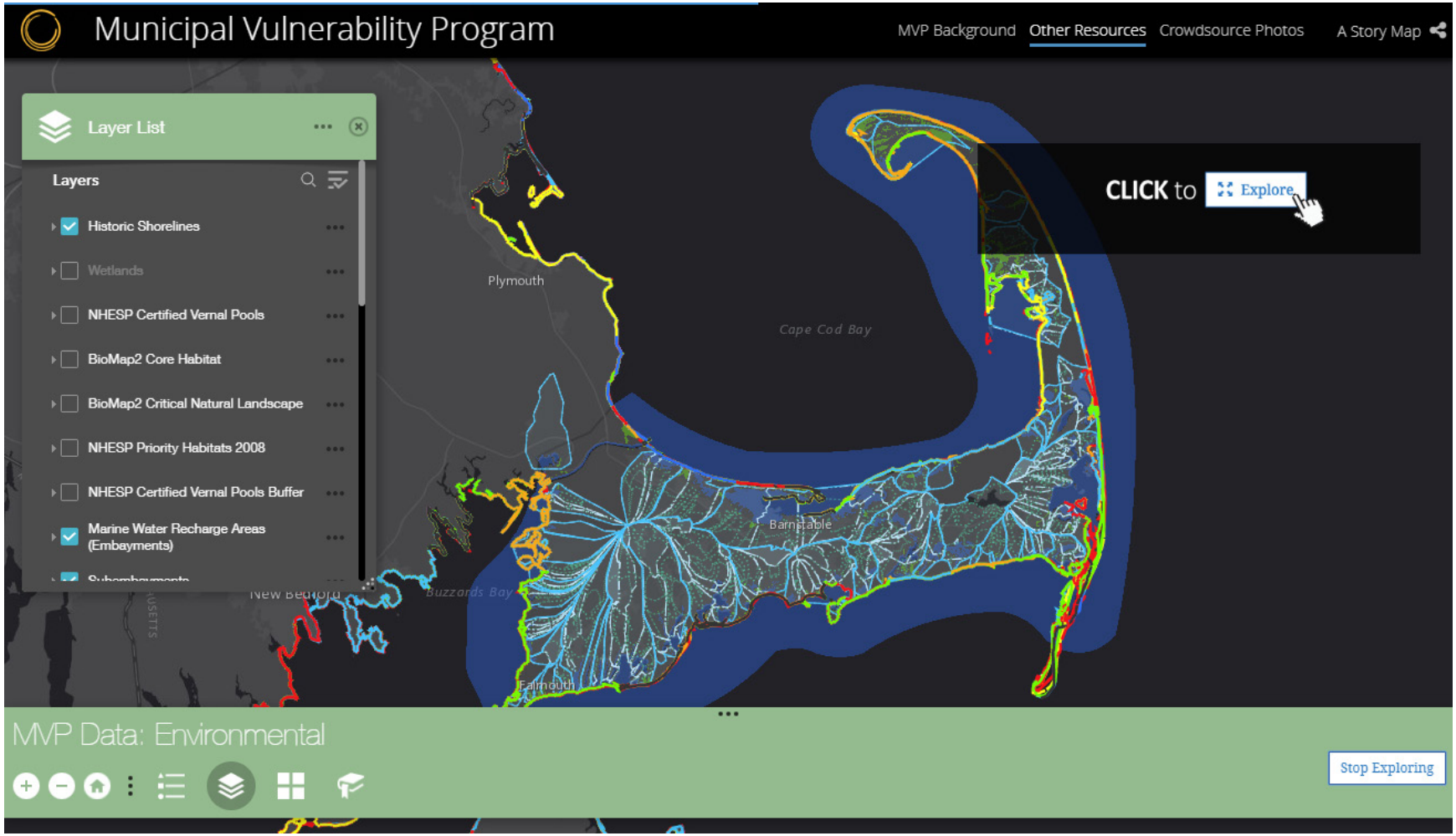
What steps can the local government take to improve the resiliency of Dennis?

ONLINE SURVEY



Other: All of above | Work with partners to get new wider bridges that could support evacuation of the peninsula when necessary. Have town workers remove hazardous trees from landowners properties to help prevent power losses, road blockages which prevent evacuation and emergency vehicle access. Do not allow future building in areas impacted by erosion, flooding, and impact water systems. | Participate in Cape Cod Climate Change Coalition programs |

PRE-WORKSHOP SURVEY RESULTS



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

Town of Dennis Municipal Vulne...

Pri

Survey Results

Question 01

Do you believe climate change threatens the town?

Answers 7 100%

Skips 0 0%

	0%	29%	58%	COUNT	PERCENT
Yes				4	57%
No				3	43%

Question 02

Rank the biggest threats to Dennis from climate change. Click and Drag to rearrange order.

Answers 7 100%

Skips 0 0%

RANK	CHOICE	WEIGHTED RANK
1	Nor'easters	2.86
2	Sever Winter Weather	3.14
3	Hurricanes	3.29
4	Coastal Erosion	4.29
5	Flooding	4.57
6	Sea Level Rise	4.71
7	Drought	5.86
8	Wild Fire	7.29

Question 03

Rank these possible actions to address climate change. Click and Drag to rearrange order.

Answers 7 100%

Skips 0 0%

RANK	CHOICE	WEIGHTED RANK
1	Review regulations on development/redevelopment in the floodplain.	4.43
2	Community safety including evaluation of shelters and communications adequacy.	4.43
3	Conduct assessment of bridge conditions relative to vulnerability.	4.57
4	Assessment of vulnerable roadways, prioritize design and improvements.	4.57

RANK	CHOICE	WEIGHTED RANK
5	Strengthen Conservation Commission Regulations.	5.71
6	Develop public education plan for evacuation, shelter in place and marina management (i.e. fridge magnets).	5.71
7	Expand and implement townwide dredging plan.	6.43
8	Assessment and prioritization of stormwater infrastructure.	8.71
9	Barrier beach protection through renourishment.	8.71
10	Powerlines/telecommunications vegetation assessment and management.	9.71
11	Conservation land funding/statement from town to maintain and increase funding to purchase land supporting climate change concerns,(marsh, drainage areas etc.).	10.29
12	Stormtide/floodway pathway analysis to identify the most critical paths to protect on the South Side.	11.29
13	Fire Management Plan.	11.43
14	Study, evaluate and implement strategies for culverts town-wide.	11.71
15	Dr. Bottero Road design and implementation to improve resiliency.	12.86
16	Red tape reduction to streamline permitting to minimize recovery timeline.	15.43

Question 04

In your own words, what is the biggest threat facing Dennis due to the impacts of climate change?

Answers 4 (57%) Skips 3 (43%)

236,419,229	Power and telecommunications infrastructure.	Friday, Apr 24th 11:14AM
236,154,809	trees - down'd wires - drought	Wednesday, Apr 15th 2:44PM
236,142,762	fear of climate change	Wednesday, Apr 15th 7:23AM
236,127,959	Sea level rise and the money of wealthy homeowners who will put pressure on local politicians to put the interests of the wealthy over the town.	Tuesday, Apr 14th 5:02PM

Question

In your words, what is the most important thing for Dennis to be pursuing to battle the impacts of climate change?

Answers 4 Skips 3

05

57% 43%

236,419,229	Fortify the basic needs of homeowners (electricity, internet) short of need to evacuate.	**Friday, Apr 24th 11:14AM**
236,154,809	tree trimming	**Wednesday, Apr 15th 2:44PM**
236,142,762	stop the sky is falling attitude	**Wednesday, Apr 15th 7:23AM**
236,127,959	We will be under water soon enough, any actions are just biding time until the inevitable happens.	**Tuesday, Apr 14th 5:02PM**

Question 06

Other comments or feedback?

Answers 1 (14%) Skips 6 (86%)

236,419,229	Thank you for doing this.	**Friday, Apr 24th 11:14AM**

PAGE 3

There may be rules that are created to set the stage for future actions that are too expensive or too political to deal with in terms of immediate action. Als, the business of flooding and sea level rise are equal in importance and the wave action makes it much worse and more expensive to create infrastructure. Otherwise it makes sense to do things like what I proposed in my last wave reduction e-mail that are self enduring and perhaps financed by the ones who benefit financially from the end result which in this case was the harvesting of various molluscs. The effort is free short of the basic set up and analysis of cost and is also self sustaining. This is also where we explore new ideas and test them to try to get the best results at the least cost. We need to add the best management mechanism to explore all the alternatives. I am interested, but want to be sure that politics - like dredging or my shore protection are not the guiding forces.

DENNIS COMMUNITY RESILIENCE BUILDING WORKSHOP
SUMMARY OF FINDINGS

PREPARED BY THE CAPE COD COMMISSION & CAPE COD COOPERATIVE EXTENSION

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